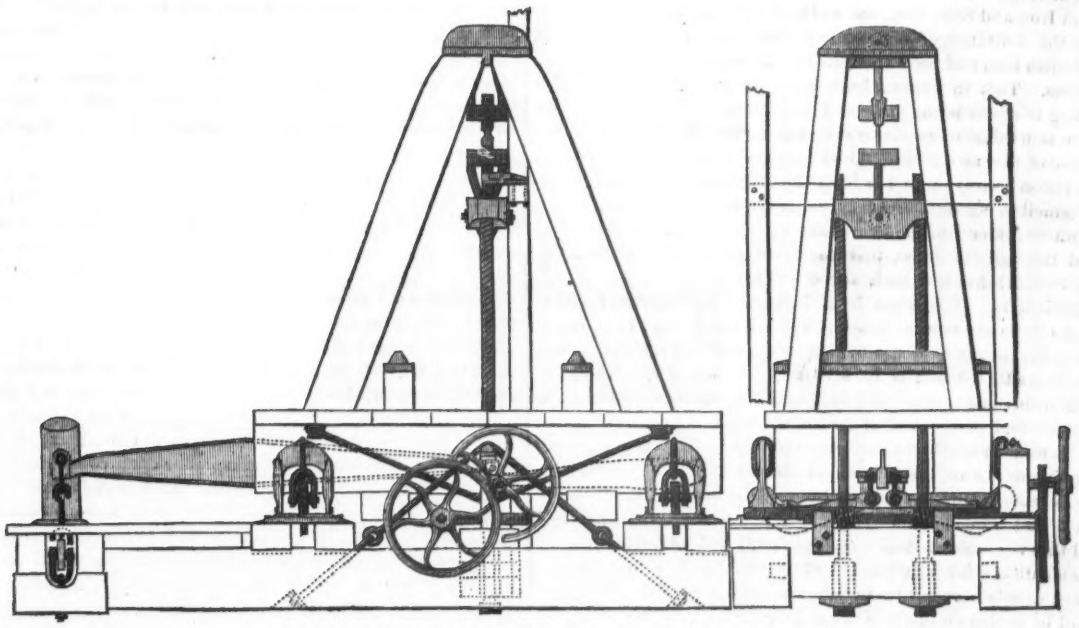
THE ENGINEERING AND MINING JOURNAL.

Vol. XVI.—No. 19.—Fourth Series. NEW YORK, TUESDAY, NOVEMBER 4, 1873. Price 10 Cents Per Copy.

The School of Mines Testing Machine.

The Messrs. Fairbanks, makers of the well known scales, have constructed for the School of Mines in New York a testing machine of an entirely new pattern and which seems to be in very every respect a simple, strong and admirable mode of applying and measuring strains. The machine is on exhibition at the Fair of the American Institute, and it is shown in the accompaning illustration which gives both a side and end perspective view, while the interior construction is indicated by dotted lines. Force is applied as usual in these machines by means of screws worked by worm gearing. These screws are upright, and rise from a strong foundation. They carry a massive block of cast iron by means of which the force employed is applied, whatever the character of the strain may be. The weight of the screws, and that of the wheels which move them is independent of the platform. Above the screws are two pairs of stout braces, upon the top of which rests a strong casting. When tension is to be employed, one end of the



THE SCHOOL OF MINES TESTING MACHINE.

bar of iron, or other substance, is placed between two wedges, in a wedged shaped opening, which is made in a yoke that depends from this top casting. The other end is fastened in a similar way by wedges in a hole made in the screw block. By revolving the screws in the proper direction, the bar is strained until it breaks. Of course the force employed is transmitted through the stout braces before mentioned, and as these rest upon the platform of a Fairbanks scale the tension is recorded in pounds avoirdupois. The accompanying illustrations show a bar in position for testing its tensile strain.

When transverse strain is to be exerted a different disposition is made. On the scale platform will be seen two wooden blocks surmounted by iron castings. These blocks are movable so that a considerable variation can be given to the distance between the points of support of the bar which is to be tested. This distance is for iron usually about 3½ feet, but this machine allows a much greater separation of the supporting blocks — up to 8 feet we believe—which is greater than any other machine permits. When the bar is in position the upright screws are turned in the opposite direction from before, the block they carry presses down upon the bar, and the pressure is transmitted directly through the platform and the levers upon which it rests to the scale beam. It is obviously possible to obtain a shearing action by fastening the bar upon an appropriate support, and fixing in the center of the screw block the necessary shearing edge. This we believe has not yet been done to this machine.

Crushing strains are applied by the same method as that last mentioned, but the object to be crushed is, of course, placed directly under the center of the screw block. This description makes it apparent that the Messrs. Fairbanks have succeeded in uniting the means of applying these four kinds of strain without falling into the evil of intricate design, or the necessity of adding special appliances for each kind of test. It now remains only to describe the arrangement of the levers upon which the platform rests.

From the foundation rise four yokes, two of whic hare seen in the drawing, and in these yokes are strong links which carry the short arms of the levers. The first levers are of the second order, and are placed so as to point to the longer axis of the platform. In that axis is a second system of levers. At the rear end of the machine is a lever, also of the second order, the short arm of which is moved by the long arm of the two rear levers above spoken of. The long arm of this central lever works a lever of the first order, which has equal arms, so that its motion is transmitted without change to the scale beam system. But the front short levers—two in number—also play in this lever of equal arms, and are attached to it at such a distance from its fulcrum as to form with it a system which is precisely the same as that formed by the three rear levers. In adjusting the machine, the Messrs. Fairbanks calculated the pressure through all the levers up to the scale beam itself. The marking of that, however, was determined experimentally, by placing known weights upon the platform, so that the utmost accuracy was obtained. The capacity of the machine is 50,000 lb., and it weighs down to divisions of 10 lb., which can easily be divided by the eye to 5 lb. Though constructed for the heaviest pressures, the weight of so light a body as a man can be ascertained by this machine to within 5 lb. to 7 lb., as has been proved by experiment, and this proves how small the friction in the machine is.

A very ingenious and handy means of recording the force exerted has been added by Mr. Miller, of Fairbanks & Co. When the force applied has nearly reached the probable breaking strain, a small weight is slid along the scale beam to its fulcrum. This weight carries a cord which connects it with clock-work placed just beyond the beam. The operation of sliding the weight on the beam winds up the clock-work, and as soon as the pressure of the hand is removed, the clock-work pulls the weight slowly back, and the position of the latter, like all weights on the scale beam, indicates a certain pressure on the platform. The clock-work is arranged to stop when the beam falls, and the result is, that whatever force is applied at the wheels, the weight is accurately recorded by this automaton. The whole machine is, in device and construction, very creditable to its makers, and the School of Mines will, no doubt, find it a valuable adjunct to its means of instruction and its capacity for practical usefulness.

The American Institute of Mining Engineers.

OCTOBER MEETING, EASTON, PA., 1873.

THE meeting was called to order at seven o'clock in the evening of October 21, President RAYMOND in the chair.

ADDRESS OF THE PRESIDENT.

GENTLEMEN OF THE AMERICAN INSTITUTE OF MINING ENGINEERS:—It is with pleasure, which I am sure all the members of the Institute share, that we gather for our autumn meeting under auspices so agreeable and encouraging. The choice of a locality and time for this meeting has been amply justified by the evidence furnished this day of the interest and importance attached by the people of Easton and the authorities of Lafayette College, to technical education. It seems to me eminently proper that the exercises of this morning, celebrating the inauguration of a magnificent building, well equipped for the teaching of science, should be followed by this meeting of the Institute, which bears witness of the usefulness of science in practice. I trust that our proceedings will be characterized, as they have been on similar occasions heretofore, by professional interest and profit, and by hearty social enjoyment. The interval which elapses between our May and October meetings is longer than any other between the meetings of the year. We ought, consequently, to expect a greater variety of experience, and a greater fullness of communication of experience at the present meeting. It has been my own fortune, during the past summer, to make a hurried trip to England and the Continent of Europe, and, although I have not been able, in the brief period which has elapsed since my return, to collect and arrange the materials I have accumulated, so as to lay before you any precise or elaborate statement concerning the European department of the profession which we represent, I shall beg your attention to a few general observations upon this subject.

First of all, let me bear witness to the extreme cordiality and hospitality with which I have everywhere been received, not only in my private capacity, and in my capacity as a Commissioner of the United States at the Vienna Exposition, but, also, as a representative of the American Institute of Mining Engineers. During the month of August I had the honor to represent this Institute as the guest of the British Iron and Steel Institute at their meeting in Liege, and to present in person the invitation of our Society, already conveyed officially in writing, that the British Iron and Steel Institute should hold a meeting next year in the United States. This invitation, I am happy to say, was received with cordiality, amounting to enthusiasm. Personal assurances reached me on every side, of the desire of individual members to accept it. This desire found expression, before the close of the meeting, in the unanimous adoption, amid general applause, of a resolution conveying to our body the thanks of the Institute, and instructing their Council to consider seriously the feasibility of the arrangement proposed. The announcement made by a cable despatch to this country, and generally circulated through the press, that the invitation had been definitely accepted, and that Philadelphia had been selected as the place of meeting, was incorrect in both particulars. It was not deemed wise, by the officers of either Society, to move hastily in the matter, since it was necessary first to ascertain approximately how many members of the British Iron and Steel Institute would probably be able to leave their business for a visit to this country. The mere acceptance of an official invitation could only lead to disappointment and chagrin if not followed by the actual presence of at least a representative number of the guests invited. It is understood that the Council of the British Institute will make the necessary inquiry at an early date, and convey to us, before our February meeting, the definite result. As regards the place of meeting, while it was certainly understood that Philadelphia should be a point to be visited, it was equally understood that the meeting itself would probably be held farther inland, and Pittsburgh was mentioned informally as one of the suitable cities for this purpose, though all such details were left for future consummation, and when they are settled at all, will be settled on this side of the Atlantic, and not the other; by the hosts, and not by the the guests, of the occasion.

One other point was raised in the conversations which I held with members of the British Institute on this subject; namely, the question whether it would not be better to postpone the meeting referred to, until the year 1876, since the Centennial celebration in Philadelphia, that year, might be expected to impart greater interest to the visit. To this the reply was made, in which I think you will all concur, that the confusion and excitement attendant upon the Centennial celebration would scarcely be favorable to the purely professional and technical profit of the meeting or the excursions. That which our English brethren would be most interested in, and most benefited by seeing, is not a great spectacular display of the products of our industries, but the actual daily operation of those industries at our mines, furnaces, rolling mills, and manufactories. Many of them, moreover, are interested in studying, to a great extent, our undeveloped resources, particularly iron ore, and these cannot be exhibited at any one point. No doubt, either collectively or individually, our guests would take the opportunity to travel as much as possible through the country. This they would do with much greater satisfaction, I think, in an ordinary year, than at a time when the interests of the country were largely concentrated upon a single point.

These opinions are corroborated by my own experience in Europe. In many instances I found that the directors of works whom I had travelled far to visit, were absent at Vienna; that their sample machines and products had been carried to Vienna for exhibition, and in some cases that the persons who could best explain to the visitor the processes or the apparatus involved were likewise at Vienna; so that it was a most unfavorable time for visiting the works.

The meeting at Liege furnished an additional example of the disadvantages of turning into a great civic festival a professional gathering of this kind. The real significance of that meeting was chiefly political and social. As an expression of international good feeling between England and Belgium; as a magnificent display of hospitality on the part of the City of Liege, and the numerous industrial establishments of the vicinity; and as a recognition on the part of royalty itself, of the dignity and importance of technical industry—the meeting at Liege could not well be surpassed and will never be forgotten. Next to the Vienna Exposition itself, it was the great industrial event of the year in Europe. But the contributions which it made to the scientific metallurgy of iron and steel were insignificant in comparison. The papers read were not more important, and the debates and discussions held were certainly less full and suggestive than they would have been had the meeting taken place under quieter circumstances. I took the liberty of assuring our friends that while I did not believe that they would have reason to complain of a lack of hospitality and courtesy in their reception here, it was not our chief intention to make that reception an affair of gunpowder, fireworks, illuminations, balls, processions, champagne and after-dinner speeches. Our desire was, while manifesting toward them the spirit of friendship and of welcome, to arrange their visit, at the same time, so as to secure for them and for ourselves the best opportunity for an interchange of information and criticism rather than of gushing sentiment. On this account, while we would rather see them during the Centennial celebration than not to see them at all, it seemed certainly preferable that they should come at a time when we could, with undivided attention, devote ourselves to their entertainment and secure for them, in the highest possible degree, the real objects of their coming.

Finally, I might have added (though I did not) that after visiting us in 1874, they will all be much more likely to come again in 1876, and thus we shall secure a double measure of their pleasant company, while they, by taking the mean of two observations, as it were, will arrive at juster views of the condition and progress of our industries.

These arguments had, I think, the effect of uniting all parties in the desire to accept the invitation of the American Institute of Mining Engineers for 1874. It is, at present, exceedingly probable that a sufficient number of our friends will express their intention of coming, to justify their council in formal and definite acceptance; and so far as our part in the transaction is concerned, it gives me great pleasure to announce to the Institute—what anybody would have been safe in prophesying before—that there will be no lack of means or good will in every quarter to make the occasion pleasant and profitable.

In an article conceived in an excellent spirit and expressing with much clearness the exact position of affairs, the *Iron Age*, of New York, speaking for the various associations of American iron and steel manufacturers, handsomely concedes that the American Institute of Mining Engineers is the proper body to play the host on such an occasion, not by reason of age or wealth, or fame, or superior dignity, but for the simple reason that it is the only national society representing the department of mining and metallurgy proper, as distinguished from the department of commerce, trade, markets and the tariff. It is right and proper that manufacturers should form associations for protection in business; but there is nothing in their membership of such associations that should prevent them from also supporting an Institute like our own, which is devoted neither to protection nor free trade; takes no ground in questions of currency, tariff, capital and labor, and recognizes in the miners, metallurgists and manufacturers of all countries, not competitors, but co-laborers.

I trust that if the projected visit of the British Iron and Steel Institute to this country comes to pass, it will find the great representatives of those industries throughout the country, however scattered in their local interests, and however active for those local interests in their separate associations, nevertheless united on a common ground and with common purpose as members and associates of the American Institute of Mining Engineers.

The passage at our last meeting, among other modifications of our previous rules, of a provision exempting foreign members and associates from the payment of dues, has enabled some of us who have been abroad this summer to represent, without embarrassment, to foreign engineers the objects and the activity of our society, and the result has been a very gratifying number of applications, from gentlemen of the highest position, for election to membership. These names will be laid before you in due course for your approval. I need not point out the great advantage which you will undoubtedly derive from such a vital connection with the representatives of our profession in the old world. Their communications will be of high importance and value, and their reception of our contributions and the use they will undoubtedly make of them both in their own practice and in technical literature, will lend to our proceedings a new and wider influence.

Not only at the Liege meeting, but also at the Vienna Convention of Mining and Metallurgical Engineers, at the end of August, and at the convention of German Geologist at Wiesbaden in the first part of September, it was clearly to be seen that the resources and industries of the United States are objects of deepest interest abroad. The convention at Vienna was intended to be international in character, but the preparations were made so hastily and at so late a day, that the committee having the matter in charge, did not feel justified in attempting to carry out the whole programme. Indeed, at one time, in an ill-founded fear lest the attendance should not be respectable in numbers, they publicly announced that the meeting would not be held. But a great many persons who, like myself, were already on the way, and who did not notice this change of plan, went to Vienna, notwithstanding; and so it came to pass that a large number of

engineers were gathered, among them such men as AKERMAN, of Sweden, FRIESE, PATERA, VON HAUER, POSEPNY, RUECKER, THIERRY, GROEGER and many others of Vienna, ABDULLAH BEY of Constantinople, the venerable GAETZSCHMANN of Freiberg, BRASSERT of Bonn and a distinguished array from Bohemia, Transylvania, Hungary and Germany. Under the circumstances, the business of the convention was confined to the conclusion of arrangements for a more formal gathering hereafter, and the appointment of a committee to take this matter in charge.

The meeting at Vienna fell short, in this way, of the results at first anticipated. It nevertheless afforded me an excellent opportunity of personal intercourse with men who actively represent the different branches of mining and metallurgy abroad. Frequent conversations with them showed me that it is the general impression that deep mining for the metals in Europe is on the decline. The greatest activity at present is devoted to iron, coal, and salt. The increasing cost and, in a large number of instances, the decreasing product of the silver mines in depth has led to a general discouragement of that industry. One effect of this has been a decided advance in the direction of concentration; another will perhaps be the gradual discontinuance of many mining operations, not because the deposits are actually exhausted, but because the determination and and the capital are wanting to continue the necessary costly explorations and to reconstruct the ancient underground workings, so as to permit the introduction of the best machinery for extraction. Thus, the mines at Freiberg, that ancient city of technical industry and instruction, are palpably diminishing in product and consuming their known resources of ore. Had the deep Elbe adit, long ago advocated by the lamented VON HERDER, been begun in time, it might now be available as a means of prolonging and perhaps rejuvenating this famous industry. Meanwhile there is no reason to expect immediate collapse. It is not in a day that such an industry can fall from the proud eminence it has laboriously won and maintained for centuries.

Evidently, however, the eyes of men are universally turned in looking for the future of vein-mining to new lands like Australia and America, and to those old lands in the far East, which, under the magic touch of modern civilization, have regained their youth. To this country, where natural obstacles and high rates of labor call forth so many ingenious economical devices, the world is looking for contributions to mechanical progress in mining; for the solution of many problems which have been neglected abroad. It is upon our virgin soil and upon the basis afforded by our scarcely diminished mineral wealth that the great experiments will be tried, and it is the superior, restless, and daring ingenuity of our people which may be expected to strike out new lines of practice. It is true, we are deficient still in disciplined judgment and in knowledge of established principles; but these things we shall acquire, partly by the help of our own experience, partly by the importation of men and ideas from abroad. Grafted upon our wild, but vigorous stock, the science of the Old World will bear new and more glorious fruit.

The acknowledgement I have made with regard to the mining and metallurgic engineers at Vienna, will apply with equal force to the German geologists, assembled in convention at Wiesbaden. It was evident that no topic discussed at that convention, with a single exception, more profoundly interested the whole body of distinguished *savans* present than the geology of the United States. The exception to which I refer was the masterly paper of Baron VON RICHTHOFEN on the geology of China, the first fruits of a prolonged and able examination of that almost unknown empire.

The Vienna Exposition naturally afforded an opportunity for obtaining a very excellent and comprehensive survey of the present condition of the mining and metallurgical activity abroad. The representation of the United States in this Department was so imperfect, as not to throw much light upon the question of our condition and prospects; but this, although it might be a disadvantage to European visitors, was a matter of relatively little importance to Americans, who visited Vienna, not to see their own country, but to study the rest of the world. It is not possible, without much more detailed labor than I have been able to bestow upon this subject, to give an exhaustive report upon mining and metallurgical science as illustrated at the Vienna Exposition, but I have thought that a few general statements, embodying some of the more salient and interesting features, would not be without interest on the present occasion.

First and foremost, the professional visitor to the Exposition could not fail to be impressed with the universal practice in Europe of basing industries of mining upon the thorough preparatory works of geological surveys. Surveys now going forward upon the continent surpass all previous undertakings of this character in minuteness and in extent. One of the most interesting exhibits of this kind contained in the Exposition was that of the Imperial Royal Geological Institution of Austria, which has its headquarters in Vienna, and is carrying on through that vast empire a most valuable geological survey. The Institution exhibited a copy of its great geological map of the empire, not yet published, together with numerous mining maps, and a collection of 1,600 samples of characteristic minerals, including ores, fuel and building materials from all parts of the empire. The additional exhibition of fossils possessed a great interest for the paleontologist. An exhibition of artificial crystals, the finest, perhaps, of this character in the world, could not fail to attract both the amateur and the scientist. Prussia, Bavaria, Baden, Saxony and other States made exhibition of maps, plans, samples, etc., from the geological surveys which in those States are the basis of the mining industry. It is easy to say that mining owes little to geology. This is, indeed, quite likely to be the case in a country like our own where the miner has only to pursue his explorations in untrodden soils, and to skim the cream from the rich mineral treasures which Nature has provided, but in older lands where the richer and more easily discovered deposits are beginning to be exhausted, and the future of mining is a question of serious anxiety, the explorations and determinations of the geologist are vitally important both to the technical industry and to the State itself. One of the most beautiful geological maps exhibited at Vienna was that of a portion of Sweden, which attracted great attention on account of its large scale (one to 50,000), and its minute accuracy. On this map the peculiarities of the surface formations are rigorously laid down, even where they consist of nothing but comparatively thin deposits of alluvium. The result is that no deposit appears to be continuous over large areas, and where we would color a whole county as granite or sandstone, the Swedish map shows it spotted all over with small areas of earth, gravel, etc., and only here and there outcrops of the granite or the sandstone. You will perceive that the principle here involved is highly important. Such a map could not be considered satisfactory by the geological student, since neither to his eye nor to his reason does it clearly indicate the geological structure of the country on a grand scale. On the other hand, furnishing, as it does, a minutely accurate photograph, so to speak, of the actual surface foundation, it is, indeed, most valuable for the farmer, since it permits what our ordinary geological maps do not, a careful classification of soils, and a determination of localities useful for brick clays, fire clays, etc. It is, in other words, a highly detailed and scientific form of the ordinary surveyor's report, and it seems to me, is not to be despised by the geologist. In fact, our geological maps ought hereafter to be prepared in both ways; once for the description of the structure of the country, and once for the description of its surface.

England, being at a great distance from the Exposition, did not make a very extensive display of her mining and metallurgical industry; yet single exhibitors were not wanting, whose products reflected great credit upon their country. One of the most interesting things in the English Department was the collection of samples of the wrought iron produced in Siemens' direct-process furnace, and also a model of the furnace, as well as of the Siemens-Martin steel furnace, which it is probable will be the chief consumer of the wrought iron produced by the direct process. It was reported at Vienna, as the claim of the inventor, that 50 per cent. of iron was obtained from 67 per cent. ores. Models of Whitwell's hot air stove for the blast furnace were also exhibited. The Oriental colonies of England were in some respects more worthily represented than the mother country. The salines of the Punjaub, the rock salt and the marine salt of the Peninsula, the product of which amounts to 12,000,000 hundredweights per annum, and yields to the Government a profit of £5,000,000 sterling, were represented. Also the coal of the interior, half a million tons of which are annually mined, more than half of this quanity being consumed by the railroads. A curious illustration of the advantage, both of geological science and the interchange of information, is found in the circumstance, that since the great discoveries of potash salts at Stassfurth, in Prussia, accompanying the beds of ordinary rock salt, these substances have also been recognized in the Indian deposits, and may be expected to add an important element to the Indian industry. Samples of Wootz steel were also on exhibition. The copper production of India is small, and confined to one work. Tin occurs both in granite and, as stream tin, in alluvial formations. The production of Malacca is now about 200,000 hundredweights. Galena, native sulphur, excellent graphite for crucibles, alluvial gold and diamonds are the principal other mineral products. The famous days of the mines of Golconda are, however, past. The present product is comparatively small, and the occurrence of large and valuable stones is exceedingly rare. In this direction, however, it is not at all improbable that thorough geological surveys might lead to the discovery of new localities not less productive than those which once supplied the world. Speaking of diamonds, I am reminded of the exhibition of these stones from Africa, particularly of the "Star of Africa," which is one of the largest stones ever brought from those fields. It weighed 83½ carats at the time of its discovery, and 46½ carats after cutting, and is valued at £40,000 sterling. Diamonds were also exhibited from Queensland, which distinguished itself, moreover, by a gold bar of 104 pounds, and by a fine piece of malachite, exhibited at the Exposition. Of course, however, the grand display of malachite was from Russia.

The industries of Sweden were represented not only by an extremely comprehensive, well arranged exhibition of products, but also by a special catalogue, compiled with great labor and beautifully printed, which contains perhaps the most comprehensive view of the condition and prospects of that prosperous country that can anywhere be obtained. It is evident from this volume and from the exhibition of products, that the iron industry of Sweden is about to undergo a radical change, since the new works that are being erected are mostly arranged for the Bessemer process, which must be considered very suitable for Sweden, since on the one hand, most of the Swedish ores are well fitted for it, and, on the other hand, the consumption of fuel required by this process is not much more than half as great as in the Lancashire puddling process, hitherto in general use. The product of Bessemer metal in Sweden was, in the year 1871, only 189,000 hundredweights, and it must be confessed that the Bessemer process, though early adopted in some localities, has made on the whole but slow progress in the kingdom. The principal cause of this circumstance lies in the great expense connected with the Bessemer plant and the necessity of conducting Bessemer operations on a large scale. Moreover the Bessemer process is more naturally fitted, not for the manufacture of wrought iron, or of ingots and bars, but

for the immediate manufacture of rails or other products from the cast ingots. But this secondary manufacture has yet to grow up in Sweden and to make its market in foreign lands. Nevertheless all the new iron works on the railroads are Bessemer works. In the year 1872 four new ones were completed, a fifth is to go into operation, and many others are in prospect. Martin steel has been manufactured since the year 1868, in one or two places, in small quantities. Cast steel is manufactured according to Uchatius' method from granulated pig mixed with pulverized rich ores and some coal. The melting takes place in plumbago crucibles in English wind furnaces heated with coke. The iron and steel manufactured by Sweden is not yet sufficient to supply entirely the necessities of the country itself, but it is rapidly attaining these dimensions. Next to iron, the copper industry is perhaps the most important, and this produced in 1871, 33,426 hundredweights of copper and 2,272 hundredweights of blue vitroil. Gold is still extracted in small quantities from the copper pyrites of Falun. Argentiferous galena is mined in a few places. The old works of Sala still continue to be the foremost. The product of silver in the year 1871 was 2,292 pounds, and of lead 2,095 hundredweights. Nickel is produced in small quantities. Zinc is not produced in Sweden. Considerable quantities of zinc blende are shipped, particularly from Ammeberg, out of the country. The shipment of this zinc ore in 1871 was 756,853 hundredweights. Sweden produces no salt except from the sea, and the artificial evaporation has long been given up on account of the price of fuel.

Manganese ore is obtained in several mines; sulphur is manufactured from pyrites, mostly at Falun; graphite is produced in Westermanland; and felspar, for the porcelain fabrication, is quarried in many parts of the country, particularly in the Stockholm district. At the famous quarry of Ytterby occur, together with the felspar, a number of very rare minerals, containing the alkaline earths of Erbium, Terbium, and Yttrium.

The product of manganese ore, graphite, and sulphur was, in various years, as follows:

	1860.	1870.	1871.
Manganese ore, cwt.....	——	16,488	9,156
Graphite, "	900	900	1,111
Sulphur, "	4,002	11,121	7,871

"Russia", it has been said, "belongs to the future." One is sometimes tempted to reverse the statement, and to say, "the future belongs to Russia;" so clear is it that the vast industrial and natural resources of this half-Asiatic empire, when once under active and skillful development, with the facilities of communication and transportation which other nations enjoy, will revolutionize in many respects the commercial relations of Europe. The most characteristic mineral product of Russia at present is platinum, of which the annual exportation, though small—only 1,000 lb.—is all-important to certain sciences and industries. The English department of the Exposition, by the way, contained a platinum retort, valued at $19,000, and capable of concentrating 20,000 lb. of sulphuric acid daily; also, a large ingot of palladium, valued at about $10,000, and extracted from $5,000,000 of platiniferous gold.

The extent, beauty, and scientific arrangement of the numerous exhibitions illustrating the mineral industries of the German Empire was such as to preclude a description on the present occasion. I pass the subject, therefore, with this simple mention, remarking only that it is one upon which I can the better afford to be silent here, since abundant information concerning it is easily accessible; and the Exposition, though it afforded an attractive and striking illustration of these manifold and productive industries, can scarcely be said to have shown them in any novel light.

In the departments of mining and metallurgy, as in almost all others, the Austrian Empire was *facile princeps* at the Exposition. The extraordinary extent and splendor of its display in many industries was but the natural result of the patriotic pride of its citizens; but patriotism cannot extemporize mines and furnaces, or the skill to analyze and explain their operations. The Exhibition of Austria (in which term I mean to include the Hungarian Kingdom) constituted an amazing revelation of natural resources, and of the national power to wield them; and its effect upon the beholder would have been still more profound, had it been collected in one place, instead of being distributed among many independent halls and buildings.

One of the most striking of these was the exhibition of the Ministry of Agriculture (which, in Austria, includes the administration of mines). Here might be seen the crude and manufactured products, models, maps, drawings, tools, technical descriptions and statistics, and complete histories, illustrating the mines operated by the State. Among these are 18 salt works, which yield a net revenue of $8,000,000. The celebrated mine of Wieliczka, so nearly ruined by inundation three or four years ago, testified its renewed activity by a magnificent pyramid of rock-salt, and a collection of tools, maps, etc., constituting a complete synopsis of its history. The Ausseer works exhibited a map dated 1611. The copper smelting works of Brixlegg, in the Tyrol, were represented by a stately obelisk of pure copper, and by a large collection of maps, drawings, specimens, etc. In the display of products, etc., from Idria, was included a kettle containing 15,000 pounds of quicksilver, in which floated a 48 pound cannon ball. The ancient industry of Przibram, in Bohemia, had gathered itself for at least one more demonstration of vitality, and crowned its exhibition with a solid block of pure silver, weighing 1,000 pounds. The mining and metallurgical activity of Carinthia was superbly represented by an array of iron, steel, lead and copper products, which filled a large separate building; and Styria was scarcely behind its sister province.

A fine display of mining machinery was made by the Machine Manufacturing Company—formerly DANEK & Co.—of Prague. This concern comprises three establishments, employing 1,500 workmen and 100 engineers, draughtsmen, etc., and supplying the whole of Bohemia. Its exhibition included hoisting and pumping engines, stone-breakers, concentrating machinery, etc. One pumping engine was exhibited, which was built in 1845, and had run without interruption twenty-seven years. I am free to say, however, even in the face of such testimony, that I do not find the forms of foreign mining machinery superior to our own. In several particulars we are far in advance—notably, I think, in stamp mills, stone-breakers, machine drills, and direct-acting steam pumps.

The enormous increase of the wealth of Austria during the last decade has scarcely been realized by the outside world. Of all European countries, (except Russia,) this is the most richly endowed with undeveloped resources; and the stimulus of a liberal political administration, with the introduction of capital and science and railroad communications, has imparted a startling rapidity to the development of those resources. It has been, perhaps, an enigma to many, how a nation notoriously bankrupt, with a regular annual deficit in its finances for more than a generation, defeated in war over and over again, could continue to borrow money at not unreasonable rates. The secret lay in the undeveloped wealth of Austria and Hungary, which constituted in the eyes of the money-lenders a guaranty of future payment.

That this confidence was not misplaced, the following figures will show:

The Austrian mining industry, exclusive of iron-refining and the salines, produced, in 1855, the value of $13,300,000. In 1871 the product was $28,350,000. The product of coal—an excellent measure of internal industry, since Austria does not export coal largely—was 36,800,000 cwt. in 1855, worth $3,100,000; and 171,500,000 cwt. in 1871, worth $14,850,000. In 1855 there were produced 4,260,000 cwt. of pig iron, worth $7,950,000; in 1871 the quantity was 5,830,000 cwt., worth $10,150,000. To arrive at an estimate of the total product of mining and metallurgical industry, we have to combine several items. Thus, to the general mining product, value.....$28,350,000
We add the gross returns of the salines, value..... 10,500,000
And the additional value of the iron refined..... 10,000,000

Total product for 1871.....$48,850,000

This production employs directly 101,032 men, women and children.

Italy leads the world in the production of a single substance—sulphur, which is obtained from the volcanoes of Sicily. The amount in 1871 was 6,869,000 cwt., and the product in all the rest of the world for the same year was but 152,500 cwt., distributed among Greece, Egypt, Roumania, Algiers, Caucasus, and America. No account is here taken of the insignificant manufacture of sulphur from pyrites. Sulphuric acid is manufactured in great quantities by that method; but not so the sulphur itself.

I could detain you much longer with these disconnected reminiscences of a picture which is deeply impressed on my memory, but it would not be possible by such repetition of mere details to communicate to you the inspiring effect produced by the mighty whole. Sooner or later, by one way or another, the inspiration will certainly come to every one of us—the sense of the greatness of this age and the swift uprising of the peoples, East and West, to take part therein—the joy of life in such a stirring time, the consciousness of responsibility, the burden of duty, the buoyancy of hope.

At the close of the President's address, some business announcements were made by the Council and the Local Committee, and a number of members and associates were elected (see full list below), after which, the Institute adjourned, to take part in the social reception, in the halls of the Pardee Scientific Department of Lafayette College, of Mr. ARIO PARDEE and the Trustees and Faculty of the College.

The following is a list of members elected in the various sessions of this meeting:

LIFE MEMBER.

JOHN E. PLATER, Eureka, Nevada.

MEMBERS AND ASSOCIATES.

EDW. SAMUEL, Philadelphia, Pa.
W. H. PLUMB, Mauch Chunk, Pa.
W. S. AYRES, Easton, Pa.
J. A. PARDEE, Easton, Pa.
W. ALLEN SMITH, Trenton, N. J.
NORMAN HALL, Sharon, Pa.
OGDEN HAIGHT, Etna, Pa.
JOHN C. SMOCK, Rutgers College, New Brunswick, N.
Prof. A. L. BAKER, Easton, Pa.
THOS. N. BROWNE, Hamilton, Nevada.
E. F. C. DAVIS, Pottsville, Pa.
GEO. S. REIS, New Castle, Pa.
JOS. KNAP, Fountain Mills, Pa.
JOS. L. PLATT, Franklin, N. J.
Prof. J. G. FOX, Easton, Pa.
WM. MC. K. MILLER, Easton, Pa.
FRANK CARTER, Pottsville, Pa.
CHAS. WEBERLING, Salt Lake City, Utah.

FOREIGN MEMBERS.

ALEXANDER BECK, Mons, Belgium.
AD. LE HARDY BEAULIEU, Brussels, Belgium.
Major F. E. B. BEAUMONT, London, England.
J. J. BODMER, London, England.
BERGHAUPTMANN BRASSERT, Bonn, Prussia.
JAMES BROGDEN, London, England.
C. I. COPELAND, Barrow-in-Furness, England.
DAVID FORBES, London, England.
Professor AUG. GILLON, Liege, Belgium.
Professor MORITZ GAETZSCHMANN, Freiberg, Saxony.
Professor S. JORDAN, Paris, France.
J. H. KNOWLES, Newport, Wales.
Professor KREISCHER, Freiberg, Saxony.
J. B. A. LORSONT, St. John's Wood, England.
THOS. MACFARLANE, Actonvale, Canada.
GEO. MACPHERSON, Tudhoe Iron Works, England.
E. P. MARTIN, Crom Avon, Wales.
PIERRE EM. MARTIN, Paris, France.
FRED. MONKS, Warrington, England.
ALBERT NOBLET, Liege, Belgium.
BERGRATH A. PATERA, Vienna, Austria.
F. POSEPNY, Vienna, Austria.
JOHN ROGERSON, Croxdale Hall, England.
Prof. RICHTER, Freiberg, Saxony.
BERGHAUPTMANN SERLO, Breslau, Prussia.
EDW. WILLIAMS, Middlesbro'-on-Tees, England.
M. H. DE WENDEL, Hayange, Lorraine.

[TO BE CONTINUED.]

THE COAL TRADE.

NEW YORK, Oct. 31, 1873.

The prices at the auction sale, as made up by Mr. JOHN MOORE, Jr., room 74, Trinity Building, are:

		Nov.	Oct.	Decline.
Steamer....	8,000 tons	$4 80½	$4.83¾	——
Broken.....	13,000 "	5.00	5.00	——
Egg.....	9,000 "	5.33½	5.31½	2c.
Store.....	36,000 "	5.46	5.45	1c.
Chestnut....	9,000 "	4.71	4.55	16c.
	75,000	$5.17	$5.18	

We have here the same anomaly that was presented last month—a sale, namely, in which prices appear to maintain themselves, or even to advance, though the market is by no means a firm one. An inspection of the figures will show, however, that the general average is no indication of the market. In fact we fail to see that the auction sale is any indication of the market. If it were we should see dealers resort there who have no other means of expressing their opinion as to the price at which coal ought to stand, while as it is, the sale seems to be a comfortable gathering of the same friends who met in the same place thirty days before, and in fact, have resorted there at monthly intervals for a long time. We do not mean to criticise this fact, but it seems a little absurd to keep up public sales which are no longer in the least degree an indication of public feeling. Coal companies have a right to fix the price at which they will sell, and if they cannot make anything at four dollars, there is neither law nor reason why they should not demand five. But the character of an auction sale is such that it is out of place when prices are to be arbitrarily kept at a given standard. The seller has a perfect right to announce a minimum price; but if that is impracticable, it seems to us better to adopt some other method of sale.

It has been pointed out to us that we were in error in saying that the Philadelphia and Reading Company is the only one left in the combination, and that, in point of fact, the coal companies are all acting together, as they have done all summer. They all agreed upon their measures, and their prices correspond, as they have done, for so many months back. The Delaware and Hudson Canal Company made no reductions for this month, but kept their prices at the rates for October, with the exception of stove, which advanced.

The bituminous trade seems to feel the dull times rather less than its rival, though, of course, its condition is good only as a degree of comparison to the anthracite trade. Prices remain at $7.25 to $7.50.

Anthracite Coal Trade for 1872 and 1873.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending, 1873, Oct. 25, compared with the week ending Oct. 26, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
Phila & Reading R.R†	97,722	3,997,472	69,378	4,271,493
†Schuylkill Canal	26,465	724,747	14,527	642,626
‡Lehigh Valley R. R.	78,623	2,735,555	42,049	2,887,697
Lehigh & Sus. R. R.	39,694	1,390,591	36,924	1,668,491
" " Canal	25,577	677,754	14,015	640,702
Scranton North	25,758	696,843	18,494	793,240
" South	37,011	1,729,962	47,375	1,766,812
Penn. Coal Co., rail	24,927	993,217	24,300	1,032,109
" " " canal	367	5,639	....	6,920
Del. Hud C. Co. Canal‡	....	1,215,558	....	1,207,456
" " East. ‡	....	447,371	....	341,317
" " West. ‡	....	230,676	....	462,374
" " South ‡	....	313,554	....	160,642
Shamokin	15,748	466,768	14,603	538,004
Trevorton	....	....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	12,848	526,580	9,008	631,068
Williamstown Co'y	....	....	....	....
Big Lick Col	....	....	....	....
Total	364,688	16,099,297	290,703	17,050,461
1872	290,703			16,999,277
Increase	73,985			951,124
Decrease				

These figures are for the week and fiscal period commencing Nov. 30.

† Local coal transported for Company's use and Bituminous coal.

‡ The table of the Delaware and Hudson Canal Co has again not been received this week at the hour of going to press.

Bituminous Coal Trade, 1872 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Oct. 25, 1873, compared with week ending Oct. 26, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	18,450	555,276	20,686	552,507
B. & O. R. R.	26,163	1,030,894	34,340	1,225,14[illegible]
Penn. S. Line	....	.....	2,343	86,269
H. & B. T. R. R.	6,915	24[illegible],623	11,871	376,676
*Harrisburg & D.	9,534	402,584	6,402	280,458
*L. V. R. R.	673	21,431	598	25,676
P. & N.Y.C. & R. Co.	7,976	309,584	6,365	263,099
{Cumberl'd Branch Canal.	5,195	184,048	4,717	115,863
{ " Railroad	727	18,126	1,378	73,382
Total	75,633	2,768,666	89,694	2,999,071
	....		75,633	2,768,666
Decrease	....		....	
Increase	....		14,061	230,405

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Oct. 25, 1873

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons.	Cwt.
From St. Clair	24,646	14
" Port Carbon	3,469	17
" Pottsville	3,246	14
" Schuylkill Haven	19,171	18
" Pine Grove	5,334	02
" Tamaqua	9,898	09
" Harrisburg	58	00
" Dauphin	3,602	10
Total	69,378	04

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	5,310	06
" Mill Creek "	140	00
" Schuylkill Valley Scales	99	17
" Mt. Carbon "	1,048	00
" Cressona "	3,066	14
" Pine Grove "	....	
" Tamaqua "	1,931	02
Total	12,301	19

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br.	344	19
" N. C. R. R. passing Locust Gap	243	18
" " " Shamokin	4,568	19
" " " Herndon	....	
Total	5,157	16

SHIPPED WEST OR SOUTH FROM PINE GROVE

Via Schuylkill & Susquehanna R. R.	1,815	04
" Lebanon & Pine Grove Branch	712	07
Total	2,527	11

CONSUMED ON LATERALS.

From Frackville Scales	1,273	08
" Mill Creek "	316	19
" Schuylkill Valley Scales	883	00
" Mt. Carbon "	882	14
" Cressona "	511	17
" Pine Grove "	60	12
" Tamaqua "	400	17
Total	4,019	07

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East	7,062	00
Cat. & Wpt. Br. Sent West	....	
" " Rupert, Cat. & Wpt. Br.	....	
" " Allentown R. Penn'a Br.	71	18
" " Alburtis, "	....	
" " Oreland, G. & N. Br.	794	04
" " Willow Street R. R.	670	00
Total	8,598	02

BITUMINOUS.

From Harrisburg	6,402	07
" Connecting R. R., G. & N. Br.	....	
" Junction R. R.	....	
Total	6,402	07

COAL FOR COMPANY'S USE.

Anthracite	5,506	10
Bituminous	147	10
Total	5,654	00

RECAPITULATION.

	Total for Week.	Corres'p'g week last year.	Increase and Decrease.
Passing over Main Line and Leb. Val. Branch	69,378 04	97,721 17	d 28,343 13
For Shipment by Canal	12,301 19	26,476 17	d 14,174 18
Shipped Westward via Northern Central R. R.	5,157 16	8,014 09	d 2,856 13
Shipped West or South from Pine Grove	2,527 11	1,941 12	i 585 19
Consumed on Laterals	4,019 07	4,400 19	d 381 12
Lehigh and Wyoming Coal	8,598 02	1,968 06	i 6,629 16
Total Anthracite p ying freig't	101,982 19	140,524 00	d 38,541 01
Bituminous	6,402 07	9,533 13	d 3,131 06
Total of all kinds paying freig't	108,385 06	187,057 13	d 41,672 07
Coal for Company's use	5,654 00	7,060 16	d 1,906 16
Total Tonnage for Week	114,039 06	157,618 09	d 43,579 03
Previously this year	5671116 10	5348347 17	i 322,768 10
Total to date	5785155 16	5505966 06	i 279,189 10

SHIPPED BY CANAL.

From Schuylkill Haven	13,031 00	24,552 00	d 11,521 00
" Port Clinton	1,496 00	788 00	i 708 00
Total Tonnage per Week	14,527 00	25,340 00	d 10,813 00
Previously this year	627,626 09	702,119 10	d 74,493 01
Total to date	642,153 09	727,459 10	d 85,306 01

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending Oct. 25—Compared with same time last year

REGION SHIPPED FROM.	TIDE. tons ct.	LOCAL. tons ct.	CANAL. tons ct.	TL. WEEK tons cwt.	TL. DATE tons cwt.
Wyoming	25401 00	7198 15	5625 18	38225 13	1478717 10
Upper Lehigh	343 17	3 29 19	535 18	3969 14	151890 19
Beaver Meadow	2424 16	2131 03	2031 16	6587 15	270726 07
Hazleton		544 12	4849 16	5094 08	179366 04
Mauch Chunk	80 10	1486 00	1599 18	31 6 08	467589 11
Total	28249 03	14409 09	14643 06	86993 18	2553800 15
Prev'ly reported	1186736 08	776002 12	453777 17	2416516 17	
Total to date	1214986 11	790093 01	518421 03	2553500 15	
Same time 1872	972594 03	703860 15	435152 19	2116352 07	
Increase	242392 08	81497 06	113268 14	437148 08	
Decrease					

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR 1873	YEAR 1872.
Forwarded East by Rail to Tidal points	28250 03	26367 03	1214986 11	972594 03
Forwarded East by Rail to Local points	6328 09	1143 18	370980 14	346404 02
Forwarded East by Rail use Central Division	2028 19	1784 02	73191 09	64445 06
Forwarded East by Rail use L. & S.	316 05	116 10	9632 12	7147 02
Delivered at and above Mauch Chunk	2478 17	1787 13	67598 11	48725 16
Delivered at Coalport & Hazard for Canal	14643 06	15516 18	582518 06	477025 08
Delivered to L. V. R. R. at Packerton	131 11	643 19	19647 04	12182 17
Delivered to L. V. R. Rd at Sugar Notch	1138 00		80476 19	
Delivered to L. & B. R. at Plymouth Bridge	1668 08	4224 08	134778 09	187827 13
Total	56983 18	51864 15	2553500 15	2116352 07

Report of Coal Transported over the Lehigh Canal

For the week ending Oct. 24, 1873.

REGIONS SHIPPED FROM.	TIDE. tons. ct.	LOCAL. tons. ct.	TL. WEEK tons cwt.	TL. DATE tons, cwt.
Mauch Chunk Region	698 02	832 02	1,530 04	194,108 19
Mauch Chunk Region Hazardville	199 03	97 07	296 10	22,307 08
Beaver Meadow Region	297 11	1,880 14	2,178 05	114,866 18
Mahanoy Region				18,299 13
Hazleton Region	1,544 06	3,686 03	5,230 09	172,617 19
Upper Lehigh Region		484 14	484 14	24,605 14
Wyoming Region	2,950 11	1,404 03	4,354 14	90,512 19
Wyoming Region, Hazardville				4,282 09
Total,	5,689 13	8,385 03	14,074 16	640,701 19
Previously reported	223 04 15	403322 08	626,627 03	
Total to date	228994 08	411707 11	640701 19	
Corresponding week last year	260207 18	417546 04	677754 02	
Increase				
Decrease	31,213 10	5,838 13	37,052 03	

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR. 1873.	YEAR. 1872.
Consumed on line of Lehigh Canal	1,325 03	3,266 14	66,743 11	66,902 06
Passed into Morris Canal to Tidal Points	598 05	822 00	2,410 12	4,816 02
Passed into Morris Canal to Local Points			26,644 07	21,793 09
Passed into Del. & Rar. Canal to Tidal Points	5,689 13	9,042 03	226,683 16	255,391 16
Passed into Del & Rar. Canal to Local Points	196 12	581 10	11,270 09	12,875 07
Consumed on line Delaware Div. Canal	402 07	1,889 05	36,837 19	41,449 15
Passed through to Bristol	5,862 16	9,975 11	270,111 05	274,525 07
	14,074 16	26,577 03	640,701 19	677,754 02

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Oct. 25, 1873, with Totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	13,726 14	783,896 13
" Hazleton	34,624 00	1,903,313 09
" Upper Lehigh	5 09	2,501 11
" Beaver Meadow	8,124 14	585,647 16
" Mahanoy	4,323 17	456,536 17
" Mauch Chunk	110 19	3,018 08
Total	58,975 13	3,784,916 14
Same time last year	79,282 09	3,497,238 04
Increase	.....	287,678 10
Decrease	20,306 16	
Forwarded East from Mauch Chunk by rail	42,049 91	2,897,596 13
Same time last year	58,602 15	2,735,585 00
Increase	.....	162,011 13
Decrease	16,553 14	

DISTRIBUTED AS FOLLOWS.

Local East of Mauch Chunk	432 06	70,364 09
Forwarded East for use L. V. R.	525 11	47,074 15
Delivered to Furnaces and Manufacturing Companies	8,503 17	614,273 00
Delivered to Cat & Fog. R. R	254 18	6,557 10
" " East Penn R. R.	44 11	8,224 09
" " North Pennsylvania Railroad	3,994 19	283,577 08
" " Port Del	4,251 04	187,416 13
" " East' Amboy Railroad	.....	.....
" " Morris and Essex Railroad	3,348 17	247,499 15
" " Bel. Del Railroad	13,088 01	941,194 17
" " Central Railroad	7,206 17	485,414 00
Delivered at and above Mauch Chunk for use of L. V. R. R.	1,341 16	61,312 14
To P. & N. Y. R. R.	7,969 19	434,114 19
To Northern Central R. R.	631 13	22,288 03
To D. H. & W. R. R.	403 08	29,282 00
To L. & S. R. R. at Packerton for rail	195 00	13,101 03
To Individuals at Mauch Chunk	26 18	2,234 03
To Individuals above Mauch Chunk	551 15	13,909 15
To L. & S. R. R., at Penn Hav., for railroad		1,541 10
Do. for canal	4,849 16	108,732 16
To Lehigh Canal Mauch Chunk	965 09	68,893 03
To Catawissa Railroad		75 00
To L. & B. R.R. at Lack. June		79,776 15
Total	58,975 13	3,784,916 14

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Oct. 25, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l, Tons. Cwt	B. & O. R. R. Tons. Cwt.	Pa. S. Line Tons. Cwt	Total. Tons. Cwt
1873	20,680 03	34,339 16	3,342 12	58,362 11
1872	18,449 11	26,163 01	....	44,612 12
Increase	2,230 12	8,176 15	3,342 12	13,749 19
Decrease	.....	.....	....	

YEAR.

1873	562,506 15	1225140 13	86,269 00	1,863,916 08
1872	555,276 07	1030893 16	....	1,586,170 03
Increase	7,230 08	194,246 17	86,269 00	277,746 05
Decrease	2,769 12	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons. Cwt.	Total. Tons. Cwt.
1873	4,717 05	1,377 13	6,094 18
1872	5,194 16	727 05	5,922 01
Increase		650 08	172 17
Decrease	477 11	.....	.....

YEAR.

1873	115,863 07	73,381 16	189,245 03
1872	184,047 13	18,126 04	202,173 17
Increase		55,255 12	
Decrease	68,184 06		12,928 14

Lykens Valley Coal Company.

Shipments of coal from Lykens Valley Coal Co., for week ending Oct. 18, 1873.

For week ending Oct. 18, 1873	2,370 16
Total shipment to date	

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Oct. 18, 1873.

	WEEK.	SEASON.
By Delaware and Hudson Canal	31,615	1,207,456
By Railroad, East	12,313	24 ,327
" West	15,141	462,374
" South	2,883	160,642
Total 1873	62,952	2,174,799
Corresponding time in 1872 :		
By Delaware and Hudson Canal	53,032	1,215,538
By Railroad, East	5,383	442,371
" West	11,495	330,675
" South	3 643	313,554
Total	79,053	2,302,139
Decrease	130,340	

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending Oct. 25, 1873.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received :		
From Lehigh Valley R. R.	7,959 19	426,114 19
" Lack. & B. R. R.	67 03	36,007 02
" Pleasant Valley R. R.		127,057 00
" Sul. & Erie R. R.	980 09	31,829 06
Total	9,007 11	631,008 07
Same time last year	12,848 02	526,530 10
Increase		104,477 17
Decrease	3,840 11	
Distributed :		
To Lehigh Valley R. R.		24,004 13
To Lack. & B. R. R.		1,443 05
To S. Central R. R.	2,052 03	141,986 03
To Ithaca & A. R. R.	1,096 16	130,296 15
To Erie R. W. Pockets for shipm't.	2,819 07	229,715 09
To Erie Railway, Watkins direct.	292 15	10,966 17
To individuals on line of road	682 08	26,190 02
To points at & above Coxton for use of Co.	591 10	23,950 00
To points between Waverley and Elmira	872 12	42,455 03
Total	9,007 11	631,008 07
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	6,300 08	260,806 06
Shipped south from Towanda	18 12	1,908 09
Northern Central R. R.	46 00	384 09
Total	6,365 00	263,099 04
Same time last year	7,975 17	309 584 00
Increase		
Decrease	1,610 17	46,484 16
Distributed :		
To Erie Railway	6,108 02	239,064 05
To So. Central R. R.	127 00	21,136 15
To Ithaca Valley R. R.	65 06	536 01
Lehigh Valley, R. R.	18 12	1,034 13
To individuals on line of Railroad.	46 00	1,209 06
To points on line of road for use of Company	....	118 04
Total	6,365 00	263,099 04
Grand totals transported		
Anthracite	9,007 11	631,008 07
Bituminous	6,365 00	263,099 04
Total	15,372 11	894,107 11
Same time last year	20,823 19	836,114 10
Increase		57,993 01
Decrease	5,451 08	

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, Oct. 25, 1873.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	18,463 14	793,239 14
Shipped South	47,375 05	1,766,811 11
	65,758 19	
Total		2,560,051 05
For the Corresponding time last Year :		
Shipped North	25,758 17	650,843 05
Shipped South	37,041 01	1,729,961 16
Total	62,799 18	2,380,805 01
Increase	3,039 01	179,246 04
Decrease		

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending Oct. 25, 1873.

	Tons. Cwt.	
East	1,749 18	
West	12,853 18	
		14,603 16
Same time last year		13,747 18
Increase		1,144 02
Decrease		
Total amount shipped to date		538,003 11
Same time last year		466,768 15
Increase		71,234 16
Decrease		

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Oct. 25, 1873.

	WEEK.	SEASON
North	53,571 02	2,220,668 03
South	2,227 05	162,869 01
Total 1873	55,798 07	2,382,937 04
Corresponding time in 1872 :		
North	56,761 01	2,127,327 17
South	8,841 00	322,395 06
Total, 1872	65,602 10	2,449,723 03
Increase North		92,740 06
Decrease North	3,189 19	
Increase South		
Decrease South	6,614 04	159,526 05
Increase		
Decrease	9,804 03	66,785 19

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Oct. 25, 1873.

	1873. WEEK.	1873. YEAR.	1874. WEEK.	1874. YEAR.
By Railway	24,300 07	1,032,108 12	24,926 17	993,217 00
" Canal	.....	6,919 14	366 11	5,638 16
	24,300 07	1,039,028 06	25,293 08	998,855 16
Increase, 1873	40,172 10			

Prices of Coal by the Cargo.

(CORRECTED WEEKLY.)

Company Coals.

Nov. 1873.

	L.	Str.	Gra.	Egg.	Sto.	Chest
*Pittston at Newburgh	5 00	5 00	5 10	5 20	5 50	4 80
*Lackawana at Rondout	5 05	5 15	5 25	5 40	5 70	5 05
Wilk'b're at Pt. John'n	5 05	5 15	5 25	5 40	5 70	5 05
Old Co. Lehigh at Pt. John'n	6 00	5 85	5 85	5 95	5 20	—
New York Coal Exchange	5 85	5 70	5 70	5 85	5 15	—
AT PHILADELPHIA.						
Hard White Ash	4 60	4 60	4 70	4 70	5 00	3 95
Free B'rn'g White Ash Coal.	4 60	4 60	4 70	4 70	5 00	3 65
Schuylkil Red Ash	— —	— —	4 70	4 85	5 15	3 95
Alaska Red Ash	— —	— —	4 70	4 70	5 00	3 95
Shamokin White Ash	— —	— —	4 80	5 00	5 20	4 10
North Franklin	— —	— —	5 20	5 20	5 10	4 00
Lorberry	— —	— —	5 50	5 50	5 50	4 35
Lykens Valley	— —	— —	— —	6 10	6 10	4 75
SHIPPED FROM ELIZABETHPORT, HOBOKEN AND TRENTON.						
L. C and N. Co., Newport	— —	— —	5 35	5 50	5 70	5 10
" " Plymouth Red Asa	— —	— —	5 5	5 60	5 80	5 10
" " Room Run	5 85	— —	5 70	5 70	5 95	5 15
Honeybrook Lehigh	5 90	— —	5 90	5 95	5 90	5 20
Fulton, "	6 10	— —	5 95	5 95	5 95	5 20
Scranton	4 85	5 10	5 20	5 55	5 65	5 00

For freights to different points see "Freights."
*To contractors only.

Prices at Baltimore—Nov. 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 05@5 70
Pittston and Plymouth, do	5 75@6 00
Shamokin Red or White Ash, do	6 00@6 25
*Lykens Valley Red Ash, do	@6 80
By retail, all kinds per ton of 2,240 lbs	7 50@8 50
*George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 85@5 00
West Va. Gas Coal	6 50
Youghigheny gas f. o. b. at L. Point, nominal	7 50
Kanawha Cannel, coarse	@12 50

* Freight to New York $2 15.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Tyrconnel f. o. b.	$7 00

Prices at Georgetown, D.C., and Alexandria, Va.

Nov. 1873.

George's Creek and Cumberland f. o. b. for shipping $4 60@4 75

Prices at Havre de Grace, Md.

Nov. 1873.

Wilkesbarre and other White Ash for Cargoes	$— —@5 00
Lykens Valley	— —@6 50
Shamokin Red or White Ash	— —@5 25

Bituminous Coals (Cumberland).

Georgetown, F.o.b.	$4 50
Baltimore	6 00
New York	7 25@7 50
South Amboy	6 50

Prices of Foreign Coals.

Nov. 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Oaking	16 00@18 50
" Cannel	13 00@18 00
" House "	20 00@21 00
" Orrel	20 00@— —

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$20 00@22 00
"Cannel, "	22 00@25 00

Per ton 2,000 lbs. delivered.

Prices of Gas Coals.

Nov. 1873.

PROVINCIAL.

Corrected weekly by Louis J. Beiloni, Jr., 41-43 Pine st., N.Y

	Coarse	Slack
Block House, f. o. b. at Cow Bay	$2 75	$1 25
Gowrie	2 25	0 00

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Picton...nett	$3 00	1 50
Sydney	3 25	1 00
Lingan	2 75	1 00
Caledonia	2 75	1 25

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm : 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale : 75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo Currency.
Westmoreland...f. o. b.	$6 00 @7 00
Fairmount Gas Coal Co. of N. Y.	6 50 @7 00
Despard Coal Co.	6 50 @7 00
Penn.	6 50 @7 00
Newburg Orrel Gas	6 50 @7 00
West Fairmount Gas Coal	6 50 @7 00
Redbank Cannel, at Pa	12 00 @60 00
AT PHILADELPHIA	
Westmoreland	7 50 @0 00

Foreign and Provincial Freight

Nov. 1873.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial.

Sydney	
Lingan	$5 00
Cow Bay	4 00
Port Caledonia	4 00
Little Glace Bay	4 00

TO BOSTON.

Sydney	4 00
Lingan	3 50
Cow Bay	3 50
Port Caledonia	3 50
Little Glace Bay	3 50

TO MONTREAL.

Caledonia	3 75 gold

TO CUBA.

Caledonia	9 50 gold.

Freights.—Nov. 1873

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Elizabethport, Port Johnston, Weehawken, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury	—	—	—	—	—
Bangor	—	3 50	2 00	2 10	—
Bath	—	2 75	2 00	2 10	—
Boston	3 10	2 75	2 15*	2 20	2‡
Bridgeport	—	2 30@2 40	1 00	1 10	1 20
Bristol	—	—	1 30	1 40	—
Cohasset Narrows	—	—	—	—	—
Derby	—	—	1 25‡	1 35	—
Dighton	2 70	—	1 35	1 45	—
East Cambridge	—	—	2 15	2 20	2 30
Fall River	2 60	2 60	1 25	1 45	1 45
Hackensack	—	—	—	—	—
Hartford	—	—	1 50	—	1 75
Hoboken	2 15	—	50	—	65
Jersey City	2 15	—	50	—	65
Lynn	—	—	—	—	—
Middletown	—	—	1 20	—	1 35
Mystic	—	—	1 25	—	1 50
New Bedford	—	2 65	1 30	1 50	1 55
Newburyport	—	3 10	2 30	—	2 35
New Haven	—	2 30@2 40	1 00	—	1 20
New London	—	2 20 & 2 40	1 20	—	1 40
Newport	—	—	1 25	1 40	1 45
New York	2 30	2 15	50	—	65
Norwalk	—	2 75	1 00	—	1 20
Norwich	—	—	1 25	—	1 45
Pawtucket	—	—	1 35‡	•	1 55
Portland	3 10	2 75	2 40	—	—
Portsmouth, N.H	3 20	3 10	2 30	—	—
Providence	2 60	2 60	1 25	1 40	1 45
Rockport	—	—	—	—	—
Saco	—	—	—	—	—
Sag Harbor	—	—	1 20	—	—
Salem	—	2 75	2 15	—	2 25
Stamford	—	—	1 00	—	—
Stonington	—	—	1 20	—	—
Taunton	—	—	1 75	—	—
Warren	—	—	1 25	—	—
TO RIVER PORTS					
Albany	—	2 85	—	—	—
Catskill	—	—	—	—	—
Cockaackie	—	—	—	—	—
Coeyman's	—	—	—	—	—
Cold Spring	—	2 65	—	—	—
Fishkill	—	—	—	—	—
Haverstraw	—	—	—	—	—
Hudson	2 65	2 85	—	•	—
New York vessels	—	—	—	—	—
Nyack	—	—	—	—	—
Poughkeepsie	—	—	—	—	—
Rhinebeck	—	—	—	—	—
Rondout	—	—	—	—	—
Saugerties	—	—	—	—	—
Sing Sing	—	—	—	—	—
Stuyvesant	—	—	—	—	—
Tarrytown	—	—	—	—	—
Troy	—	2 60	—	—	—
West Point	—	—	—	—	—
Yonkers	—	—	—	—	—

+ 3 c. per bridge per ton in addition to freight.
† New Haven rate and towing 25 c. extra per ton.
‡ Towing from Providence and return, extra.
‖ And Towing.

St. Thomas	$— — Gold
Martinique	— — "
Demerara	— — "
New Orleans	— — "
Mobile	— — "

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven	
Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75	
Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon.	
MAUCH CHUNK TO ELIZABETHPORT.	
L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23
MAUCH CHUNK TO PORT JOHNSTON.	
L. V. R.R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23
TO HOBOKEN	
L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken,	6
Shipping expenses	25
Wharfage	00
Total	$2 23
TO SOUTH AMBOY.	
L. V. R. R.	..
B. & D. R. R.	$1
Cam. & Am R. R.	
Shipping Expenses,	35
Total	$2 23
PENN HAVEN TO ELIZABETHPORT.	
L. V. R R. Penn Haven to Phillipsburgh	84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

MARKET REVIEW.

NEW YORK, Oct. 30, 1873.

IRON—The stock of Eglinton Scotch Pig is very light, and we believe there is still but little on the way. Glengarnock has been in better supply, and the price has shown a greater reduction comparatively than in the other brands ; we quote Eglinton $39@$40, while sales of Glengarnock have been reported at a price under $40, in all about 300 tons, part gold, in bond, and the remainder as noted above. American Pig is irregular, and there seems to be no higher prospects ahead than we have noticed for some time past ; there seems some inquiry, but prices are governed to a great extent by the necessities of the sellers, and our quotations must be

called nominal; sales are reported of 500 tons No. 2 Allentown at about $32; there are orders for more and also for Gray Forge in the market, but at limits that holders are not willing to accept at present. New English Rails are without business; we quote $67@$68 gold, but less figures would probably buy; old T are held at $40 cash—this price, however, is generally below most holders views; the stock of D. H. is nearly all in one hand, and we understand is not offered at present. Scrap tends downward—100 tons sold from dock at $39. Refined Bar from store continues dull, selling only in small lots as wanted for consumption, but our quotations are the top rates, there being no inquiry for large lots, by which to fix a minimum price.

LONDON, Oct. 13.—From the monthly circular of S. W. HOPKINS & Co.:—

EXPORT OF RAILS FROM GREAT BRITAIN.

	Month ending Sept. 30.		9 mos. ending Sept. 30.	
	1872.	1873.	1872.	1873.
To United States...tons.	37,732	10,642	370,053	151,972
All other Countries..	55,661	81,498	342,917	439,624
Total.....tons.	93,383	92,140	720,970	591,596
Old Iron to all Countries.	10,058	5,075	85,805	51,673
Pig Iron to U. S.....	16,602	9,555	168,933	87,958

LEAD—Pig is very quiet, and we hear of no sales; Ordinary Foreign is held at 7 cents, and Domestic at 6¾ @6¼ gold. Bar 9¼ cents, Sheet and Pipe 10½, and Tin-lined Pipe 16¼, less 10 per cent to the Trade.

COPPER—The manufacturers of Copper and Yellow Metal are nominally steady at our quoted prices. Ingot is increasingly dull, and prices are irregular and lower; we note sales of 75,000 lb. Lake, in small lots, at 22½ cents prompt cash; in the regular way, 23½@24 cents is generally asked.

STEEL—The market is more quiet, and less firm than it has been for a year past—especially is this the case in regard to Foreign Cast.

SPELTER—Remains very dull, and, in the absence of business, our quotations are nominal,

TIN—There is scarcely any inquiry for Pig, and we have but to note the sales of 100 slabs Straits at 29½ cents; the nominal quotations are, Straits 29@29½, English L. & F. 27, Refined English 28, and Banca 33 gold. The demand for Plates is also very light, and the market is still depressed; sales have been made of 500 bxs. Charcoal Tin, prime brands, at $9.75; and 250 do. Charcoal Terne, $9.62½ gold. The mercantile community of Boston has met with a severe loss by the sudden death of Mr. CYRUS WAKEFIELD, of that City, the largest importer of Straits Tin, Spices, and other products of the East Indies, in the United States. Mr. WAKEFIELD was a most enterprising, honorable and sagacious merchant, universally respected and esteemed by a very large circle of acquaintances here, as well as in Boston and its neighborhood.

ROTTERDAM, Oct. 13.—Notwithstanding that the last auction of the Trading Company went off well, the 30,000 slabs Tin which were offered being sold at f.74½@f.76, buyers could now easily purchase at f.1@f.2 under the auction prices. Banca has been sold at f.74½@f.73, and Billiton at f.74@f.72. The alteration of the auction system seems to have had a bad influence on the market.

ZINC—Sheet continues quiet, and from dealers' hands, sells at 8¼@8¾ cents net gold. Manganese black oxide 4 cents, do. gray peroxide 6 cents.

The following list of items we take from a recent statement, "sent to the Treasury Department," of British Manufacturers exported to the United States, during the eight months, ending with August, 1872 and 1873:

	1873.	1872.
Pig.....tons.	78,403	153,332
Bar Bolts & Rod.....	21,574	49,316
Railroad.....	141,330	340,321
Sheet, Hoop, &c.....	14,296	22,620
Cast or Wrought	11,806	9,068
Steel Unwrought.....	13,966	16,198
Tin Plates	64,353	63,739
Tin Unwrought.....cwts.	18,489	14,460
Lead, Pig, Pipe & Sheet ...tons.	2,334	5,757
Hardware & Cutlery.....£	548,925	£651,222

METALS.

NEW YORK, Oct. 30, 1873.

IRON.—Duty: Bars, 1 to 1¼ cents ₩ lb.; Railroad, 70 cents ₩ ton; Boiler and Plate, 1¼ cents ₩ lb.; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₩ lb.; Pig, $7 ₩ ton; Polished Sheet, 3 cts. ₩ lb.; Galvanized 2¼; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Prices.
Pig, Scotch—Coltness ₩ ton.....	46 00@48 00
Gartsherrie	48 00@— —
Glengarnock.....	40 00@— —
Eglinton	39 00@41 00
Pig, American, No. 1.....	28 00@40 00
Pig, American, No. 2.....	30 00@32 00
Pig, American, Forge.....	28 00@30 00
Bar Refined, English and American.....	— —@— —
Bar Swedes, assorted sizes (gold	— —@137 50
Bar, Swedes, 1¼ to 5 x ¾ & ¾ 2 sq. & 6 to 12 x ¾ & ¼..	175 00@— —
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in.	82 50@— —
Bar, Refined, 1¼ to 6 by ¼.....	87 50@— —
Bar, Refined, 2¾ to 2¾ round 1 & 1¼ by ¼ & 5:16.....	90 00@— —
Large Rounds.....	92 50@107 50
Scroll.....	102 50@135 00
Ovals and half-round.....	110 50@130 00
Band.....	102 50@105 00
Horse Shoe.....	117 50@— —
Rods, ¾ to 3-16 inch.....	92 50@135 00
Hoop.....	120 00@160 00
Nailrod.....	— @ 9
Sheet, Russia, as to assortment (gold)	17¾@ 18½
Sheet, Singles, D. and T. Common.....	—5½@— 6¾
Sheet, D. and T. Charcoal.....	—6¾@— 8
Sheet, Galv'd, list 10 per cent, discount.....	— —@— —
Rails, English (gold), ₩ ton.....	63 00@ 65 00
Rails, American, at Works in Pennsylvania, currency	70 00@ 75 00

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ₩ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₩ lb.....	— @— 38
Copper Bolts	— @— 40
Copper Braziers, 16oz. and over.....	— @— 40
Copper Nails.....	— @— 45
Copper, Old Sheathing, &c. mixed lots.....	21 @— —
Copper, Old, for chemical purposes, 14@16 oz....	— @— —
Copper, American Ingot, Cash.....	22½@— 23
Copper English Pig.....	— @— —
Yellow Metal, New Sheathing & Bronze.....	— @— 26
Yellow Metal Bolts.....	— @— 32
Yellow Metal Nails, Sheathing and Slat'g....	28 @— —

LEAD.—Duty: Pig, $2 ₩ 100 lbs.; old Lead, 1½ cents ₩ lb

Pipe and Sheet, 2¾ cents ₩ lb.	
Spanish (gold).....	— —@7 00
German, do.	— —@7 00
English do.	— —@7 00
Foreign, Refined.....	7 25 @7 50
Domestic do.....	6 37½@6 50
Bar.....(net).....	9 25 @— —
Pipe.....(net).....	— —@10 50
Sheet.....	— —@10 50

STEEL.—Duty: Bars and ingots, valued at 7 cents ₩ lb or under 2¼ cents; over 7 cents and not above 11, 3 cents ₩ lb; over 11 cents, 3½ cents ₩ lb, and 10 ₩ cent ad val. Store prices.

English Cast (2d and 1st quality) ₩ lb.....	— 17½@— 22
English Spring (2d and 1st quality).....	— 9½@— 10½
English Blister (2d and 1st quality).....	— 14 @— 18½
English Machinery.....	— 14½@— —
English German (2d an 1st quality).....	— 12½@— 14½
American Blister "Black Diamond".....	— —@— 11½
American, Cast, Tool do.	— —@— 17
American, Spring, do.	— —@— 11
American Machinery do.	— 11½@— 12
American German, do	— 9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ₩ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₩ cent.; Roofing 25. ad val.

	Gold ₩ lb.
Banca.....	33 @— —
Straits.....	29¼@29½
English.....	27 @— —
English Refined Gold.....	28 @—

PLATES. Fair to Good Brands.	Gold.	Currency
I. C. Charcoal, ₩ box.....$	9 50 @10 00	$11 00 @11 50
I. C. Coke	7 25 @ 8 00	8 50 @ 9 50
Coke Terne.....	7 00 @ 7 75	8 25 @ 9 25
Charcoal Terne.....	9 50 @ 9 75	11 00 @11 25

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100lb

Plates, Foreign.....(gold).....p. 100 lb.	7 50 @—7 75
Plates, Domestic.....p. lb.	8½@—11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c per lb

Sheet..... per lb.—	9¾ @ 10

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, Oct. 31, 1873.

The following from the San Francisco Stock Board is dated the 28th inst. Savage, Crown Point, Yellow Jacket, and Belcher have advanced, the remaining portion of the list is nominally unchanged.

Savage.....	—	—	52
Crown Point.....	—	—	109
Yellow Jacket.....	—	—	62
Kentuck, "New Issue".....	—	—	14
Chollar Potosi.....	—	—	45
Gould & Curry "New Issue".....	—	—	12
Belcher "New Issue".....	—	—	71
Imperial.....	—	—	4⅞
Raymond & Ely.....	—	—	55
Meadow Valley.....	—	—	14
Eureka G. V.....	—	—	22½
Ophir.....	—	—	—
Hale and Norcross.....	—	—	—

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues are payable in advance at the annual (May) meeting. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The first volume of Transactions of the Institute is in course of preparation and will be sent, as soon as issued, to all members not in arrears.

THOMAS M. DROWN, Secretary.
1123 Girard street, Philadelphia, Pa.

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April 22.1y

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P. O. Box 2487 N. Y.

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Iron Broker and Commission Merchant,
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Dec, 31:tf

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ANALYTICAL CHEMIST
AND
CONSULTING METALLURGIST.
1123 GIRARD STREET,
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AND COUNSELLOR-AT-LAW.
No. 37 PARK ROW NEW YORK, ROOM 22.
Advice in Patent Law given free. 1y28:tf

W. B. COGSWELL,
Civil & Mechanical Engineer.
SPECIALITY:
Blast Furnace Construction.
P. O. Address
Franklin Iron Works,
Oneida County,
Nov. 19:1y N. Y.

ISIDOR WALZ, Ph.D.
ANALYTICAL AND CONSULTING CHEMIST
No. 18 EXCHANGE PLACE,
NEW YORK.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.
JOHN A. CHURCH, E. M. Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and power society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by Engineers or their employees.

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The Postage on THE ENGINEERING AND MINING JOURNAL *is twenty cents a year, payable quarterly in advance, at the office where received.*

THE SCIENTIFIC PUBLISHING COMPANY.
WILLIAM VENTZ, SECRETARY.
27 Park Place,
P. O. Box 4404. NEW YORK CITY.

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THE National Academy of Sciences held a very agreeable meeting at Columbia College, last week, under the presidency of Professor PIERCE. A number of interesting and valuable papers were read, whose contents, however, were of a nature too purely abstract for our columns. On the evening of October 30th the members, together with many of the scientific men of New York and its neighborhood, were invited to a reception at the house of Dr. BARNARD, President of Columbia College.

THE great telescope, of which the newspapers have so often spoken, has at length arrived in Washington. It has an object glass, imported from England, of 26½ inches diameter, and a focal length of 32 feet, and, as the largest refracting telescope now in use has a diameter of 25 inches, we "beat the world" to the extent of an inch and a half. But, apart from the glorification of the secular press over the size of the object glass, the erection of this telescope is a really important event to our country. Astronomy was one of the sciences which early took root in America, and produced brilliant fruit. Our national scientific history is inseparably connected with it, and the telescope in Washington will be anything but a toy. It will be mounted under a dome 41 feet in diameter and 21 feet high, the dome running on rollers and revolved by a turbine wheel worked by water drawn from the city mains.

THE Government last week attempted to commence the payment of silver coin in small amounts, a step preliminary to a resumption of specie payment. Some of the daily papers have thrown a good deal of ridicule upon this effort because of the comparatively insignificant amounts dealt out. We cannot agree in this view. The amount of bullion which is called for in small amounts by a people so numerous as ours is something almost incredible. The first silver half-dollar is kept for a while, partly to show and partly for old acquaintance sake; and if we reflect for a moment that if one individual in four in this country receives and keeps a half-dollar, the sum total amounts to $5,000,000, we may come to the conclusion that the Secretary of the Treasury does well to satisfy this part of the demand first. So far as the resumption of specie payment is concerned, this seems to be a very favorable time in some respects. Manufacturers will probably call for less bullion this Winter than for a long time past, a considerable quantity is brought in from abroad, and the production of the mines will probably not depart materially from its usual standpoint. But, though the opportunity appears favorable, we are not of those who think that Government can take up specie payment at one stroke. Within ten years the necessities of the country have grown so much that it is doubtful if specie enough can be collected and coined within a year, or two, to supply the place of greenbacks. For a long time the Government would be at the mercy of agitators whose slightest whisper would be sufficient to cause a momentary hoarding of coin, or to arouse speculative movements which, however hopeless they might be, would still hinder the Government's work. We look to the prevailing tendency of wages and all prices toward the *ante bellum* standards as the most effective preparation possible for specie payment, and it is probably the last step in our progress toward that consummation.

Mining Decisions.

CHIEF Justice MCKEAN, of Utah, has rendered two decisions of importance, which we find reported in full in the Salt Lake *Leader* of Oct. 11.

The first case was that of the Highland Chief *versus* the Prince of Wales and Antelope titles, in Big Cottonwood. The names of the parties to the suit, and the point in the case directly settled by the decision (which was merely the overruling of a demurrer) are not important to the general public. The principle involved is one which deserves attention, namely, that the patent to mining property granted by the United States is merely a quit claim on the part of the United States, and cannot destroy the previously existing equities of the case. In this instance, of two parties applying for patents, the party making the later application, and having the younger location, received its patent first; and the court holds that "the younger patent, in which are merged the elder equities, prevails over the elder patent founded upon the younger equities." Moreover, the rights of the earlier locators, acquired under local and former Congressional laws, are expressly recognized by the Act of 1872 (sec. 16); and "neither the Register nor the Receiver of the local, nor the Commissioner of the General Law Office, nor the Secretary of the Interior, nor the President of the United States, nor all of them together, have authority to take from the defendants what Congress has conceded to them, and give it to the plaintiff."

The second case was that of the Wyoming patent, in the American Fork mining district, which was applied for March 20, 1872, and issued Sept, 30, 1872, there being at the time no adverse claim on file at the General Land Office in Washington. A protest had, however, been lodged at the Land Office in Salt Lake City, June 18, 1872, which was "overlooked" by the Register, and was subsequently forwarded by him to Washington, Oct. 17, 1872, several weeks after the patent had been issued. The patent is, of course, null and void, having been illegally issued, in defiance of the protestant's right to be heard; but the question is, who shall take proceedings to recall it? The United States has done this; and Justice MCKEAN, in overruling the demurrer of the defendants (holders of the patent) declares it to be the duty and right of the Government to reclaim the patent, and, if necessary, to force its return to the Land Office, that the whole case may be reopened and properly adjudicated. The Miller Company, which is the protestant, should not be burdened with any part of the responsibility, cost or pains of making good the default of the local Land Office. When the patent has been recalled and annulled, the protestant must proceed to make good his claim, if he can.

Both these decisions are obviously just, and manifest a perception of the true nature and extent of the rights conveyed by a patent, which we have not always been able to find in the utterances of the Utah Bench. They will have a wholesome effect in putting a stop to the tricks and chicanery by which claimants have endeavored to obtain unfair advantages from the Land Office. We shall hear less of "oversights" and other little games at Salt Lake, or elsewhere, if it is clearly understood that the holders of patents are not possessed of all the rights that anybody is bound to respect.

Purchasers of mining property should take this lesson also to heart: That the mere presentation of a patent is not conclusive proof of perfect title, unless that patent is untainted with fraud or mistake; and that the Government itself will interfere to correct its own errors. A considerable number of very innocent capitalists, who have bought lawsuits as well as mines during the past five years, in various parts of the country, have reason to wish they had thought of this before.

Finally, it occurs to us as an extra-judicial deduction from these decisions, that the practice of the Register of the Salt Lake Land Office, in forwarding documents to Washington, of keeping back those which favor one party until it is too late to prevent the success of the other, is a practice calculated to adorn a strictly private, rather than an official, career. We can't maintain that particular variety of Register, merely for the pleasure of getting sensible and forcible decisions from Chief Justice MCKEAN.

Some Results of Wet Concentration of Ores by means of the Utsch Automatic Jig and "Fine Grain Jig."*

BY H. ENGELMANN, E.M.

AT the last meeting of the Institute I placed before its members a description of a new jig with automatically regulated discharge, the invention of Mr. UTSCH. This paper has created some discussion in the journals; and I believe it will be interesting to many to have some numbers and facts in regard to this matter, taken from the actual results of the ore-dressing works of the Matthiessen and Hegeler Zinc Company of Lasalle, Ill., who were the first to introduce this machine in the United States, and are the agents of the inventor.

The ores treated in these works are partly blende, partly zinc carbonate, obtained mainly from numerous mines of the lead region of Wisconsin. They all contain some lead ore, besides pyrites, rock, &c. All paying quantities of galena are separated from the ore by the miners, and only such is left as the miners can-

*A paper read before the American Institute of Mining Engineers at Easton, Pa., Oct. 22, 1873.

not separate in the ordinary Cornish jigs, or without too great expense. The ores thus retain on the average 3¼ per cent. of lead, according to analyses continually made. This lead is partly in the form of galena, partly oxidized, and then frequently intimately mixed with the zinc ore, so that mechanical separation is impossible, and it cannot even be detected by the eye The average quantity of raw ore dressed per month has been over 2,100,000 lb. during the last 12 months, the running time being 10 hours per day.

By far the largest portion of these ores (about 85 per cent.) passes through one operation only of the jigs; the raw ore is not a poor ore on the average, although part of it is low grade. The coarsest grain passes through a screen with holes of 15 millimeters (3-5 inch) diameter. When ordinary coarse ore is being treated, about 82 per cent. of the ore is obtained in grains between 15 and 1 millimeter (3-5 and 1-25 inch) diameter, which are washed on 4 different Utsch jigs. Of the remaining 18 per cent. under 1 millimeter diameter, 8 per cent. forms the two coarsest classes of sand, * and is treated on an Utsch fine grain jig, with 120 strokes per minute. Notwithstanding the low percentage of lead in the raw material, this also gives pure galena and workable zinc ore in the first operation. The remaining 10 per cent. of the ore is divided between the finest sand, flour (of which two classes are separated) and slime. The flour is treated on a fine-grain jig with 300 pulsations or strokes per minute; and even more might be applied advantageously for such fine material. The idea that water jigs cannot be worked so rapidly is entirely groundless; only coarse grains require long, strong, and not too rapid plunger strokes, and thick layers; while fine grains require numerous, rapid and minute pulsations, and thin layers.

The galena from fine flour is not concentrated in one operation. It could readily be done, if the percentage was higher. At present the object is to obtain as good a zinc ore in the first operation, and as much of it as possible. A recent analysis gave the following results from this jig:

The raw flour contained.....	3¼	per cent. lead.
The 1st partition of the jig.....21.99	"	"
The 2d partition of the jig..... 1.98	"	"
The 3d partition of the jig..... 2.11	"	"
The 4th partition of the jig..... 2.39	"	"

The percentage of zinc is highest in the second partition. This result is curious, but easily explained. All the coarser flour of lead is obtained in the first partition. In the other ones we find either such particles of lead ore as cannot be separated mechanically from the zinc ore, (carbonate of lead combined with carbonate of zinc,) or particles of such extreme fineness that they float and belong more properly to the slimes, (*todtgepochtes*—"dead crushed" lead, as the Germans call it). The contents of the first partition of this jig are concentrated in one more operation.

The remaining 5 per cent. of the ore are slimes, which may be dressed on buddles, etc., and frequently will not pay for concentrating, at our prices of ore, labor, etc., because they yield an inferior concentrate.

Of the 3¼ per cent. of lead in the ore, on a large average the loss in lead is 2 per cent. of the raw material—40 pounds per ton of ore treated. In this case scarcely 50 per cent. is saved; but the loss would not be much greater in weight of lead if the ore contained 30 or 50 per cent. of it. Part of this loss is caused, as I have stated, by the chemical combination, or rather the mixture of the carbonates. Another portion is caused by the insufficient mechanical separation of the galena from the zinc ore, and by the imperfection attending all operations on a large scale, especially those depending to a certain degree upon manual labor, (in this case, upon the regularity with which the crusher is fed). It is not advisable in this instance to crush the ore finer, because the coarse jig-stuff is, after all, richer than the finer. The loss of zinc ore in this concentration is very small.

I have stated actual facts—actual working results—including all disturbances, irregularities and troubles of regular operations. They are not made-up returns. The percentages of lead are determined by often repeated chemical analyses. Fire assays would be entirely inadequate under such circumstances'; and the eye cannot detect the lead in many instances where the analysis shows its presence.

NEW PUBLICATIONS.

A DICTIONARY OF SCIENCE; Preceded by an Essay on the History of the Physical Sciences. Edited by G. F. RODWELL, F.R.A.S., F.C.S. Philadelphia: J. B. LIPPINCOTT & Co.

THIS book has for its object to give as complete an account as possible in a small space of the more strictly experimental sciences, divested of abstruse treatment and difficult formulæ. The scope of the work includes Astronomy, Physics and Chemistry, the classificatory sciences, both organic and inorganic, being reserved for treatment in other works of the same series. The list of contributors contains the names of CROOKES, PROCTOR, GUTHRIE and other leading English scientists—names which give promise of thoroughness and reliability in the various articles which compose the work. After careful examination, we are of the opinion that this promise is abundantly fulfilled. The brief but interesting History of the Physical Sciences by the editor, Mr. RODWELL, adds greatly to the value of the book. It is well up to date, including the results of scientific research during the year 1870; and it cannot fail to be of use to all who are interested in the present condition of Physical Science.

* The 8 per cent. of material under 1 mm., etc., would be, according to RITTINGER'S classification, "the coarsest flour." I have called it sand. The finest stuff treated on this jig, which I call "the finest sand," is on the line between flour and slime. Almost all the galena in it passes almost through a No. 60 sieve, (holes about 0.3 mm. in diameter,) as does the larger part of the accompanying gangue. The size is therefore 0.25 mm. to 0.35 mm., or just over the line of the slime of RITTINGER. There are still more finely divided materials, which I call slime proper.

Iron and Steel Exhibits at Chicago.

THE spirit of the exposition is epitomized in the exhibitions made by the great iron and steel manufacturers. It is here that to many it finds its best embodiment. Conceding the greatness of the Northwest as an agricultural and stock-raising region, people have been content to think that its progress is comprised in the products which its superiority in these respects so generously yields. The prospect of its great cities assuming an importance as manufacturing points, has almost been lost sight of by the masses. The displays made by the iron-makers show what these products are, and indicate to what extent the mining wealth of the West is being taken advantage of by points brought near to the ore regions by rail and lake navigation. Among all the industries represented, there are none of such vital and general importance, and there are none apparently that have been less appreciated and understood. People have only just begun to be alive to their importance, and the yet more valuable increase in our interests which they promise for the future. The exposition is useful in popularizing these great industries, and dispelling the ignorance that has heretofore existed regarding them. It is surprising how little they have known concerning them. When iron manufactories have been spoken of, their thoughts have reverted to Pittsburgh and other Eastern cities, while here in our midst we have establishments of national importance; and they talk of England and Lowmoor iron, when in the Lake Superior regions there is to be found a better quality in exhaustless quantities.

Among the exhibitors is the North Chicago Rolling Mills Company, of which Captain E. B. WARD is President. These mills have an annual capacity of 25,000 tons Bessemer steel rails, 30,000 tons railroad iron, and 50,000 tons pig metal. The samples which the company expose are very fine and extensive, and attract a large degree of attention. There are a variety of iron and steel rails made from the various patterns adopted by the Western roads, which hold an important place in the collection. Their merits are sufficiently vouched for when it is said that this company rolls rails for nearly all the roads centering in Chicago. At present they are working upon a large contract for the Chicago and Northwestern Railroad, and are finishing large supplies of steel rails for several roads building double tracks, or replacing old iron rails with them. The texture of the metal used in them is illustrated by rails twisted, curled, bent double, and subjected to any process which will show the torsion, strength and ductility of the metal. One of the most curious specimens is that of a polished steel rail, about four feet in length, twisted while cold. The test thus given to the quality of the metal is severe and certain to bring to light any of its imperfections. The rail in question shows not a fracture, flaw, or even the slightest blemish.

A number of broken steel ingots were also among the exhibition. They weigh from 1,100 to 1,400 pounds each, are perfectly solid, and show a texture and density that is not excelled by any Bessemer steel mill in this or any other country. The company claim that they are making as fine an ingot as is manufactured in the world. Their works are working most successfully, and with the aid of the improved machinery which their comparatively recent construction has given them an opportunity to adopt, they are doing a business which almost equals in extent that of any other establishment. They are at present making almost all their rails of steel. The railroads find that their superior durability and strength make their use economical, and on main lines and where old rails are being replaced, they are being used exclusively. In the manufacture of Bessemer steel the company claim that it has advantages over any of the establishments in England. The quality of the Lake Superior iron is particularly adapted to the manufacture of steel, and it excels the best brands of the foreign market. The company are the owners of vast mining interests in the Lake Superior region, and they carry on the process of manufacturing through all the details, from mining the ore to turning out the rails. They use this ore entirely, although the extent of their business often obliges them to purchase from smelting companies. The quality of the steel made from this iron has been exhibited alongside that of the best manufactured in foreign lands. At the Paris Exposition the tests proved that it was superior to the English iron, and it gained a medal. A piece which had been recently tested was on exhibition. It stood the remarkable test of 73,250 pounds to the square inch, with an elongation of sixteen per cent. A sample of chains manufactured of Bessemer steel, at the Wyandotte (Michigan) Rolling Mills, of which company Captain WARD is also President, constitute an interesting feature of the display. A comparative list of these chains with those of English make shows the following result:

Size.	Quality.	Strength by test.	Difference in favor of American chain.
1¼ inch.....	American.....	101,750	
	English.....	76,500—	25,250
⅞ inch.....	American.....	28,875	
	English.....	19,000—	9,875
¾ inch.....	American.....	38,000	
	English.....	26,000—	12,000
½ inch.....	American.....	15,825	
	English.....	8,500—	7,325
7-16 inch.....	American.....	10,250	
	English.....	5,750—	4,500

This company have recently made a specialty of boiler iron. They have a spe-

nge iron on exhibition, the largest ever rolled west of the Alleghany Mountains. Larger sheets of common iron are rolled at but one shop in the country, and it is located somewhere in New Jersey. This plate is 19 feet long, 6 feet wide, 5-16 of an inch thick, and weighs 1,485 pounds. There is also on exhibition a boiler-head 96 inches in diameter, ⅜ of an inch thick.

The Jolliet, Ill., Bessemer Steel Works have also a very creditable display of flange iron and steel rails.—*Correspondence of N. Y. Times.*

The Port Henry Iron Mines.

A CORRESPONDENT of the New York *Times* gives a description of the famous iron mines at Port Henry, on Lake Champlain, from which we take the following:

"I shall confine myself in this letter to the great beds belonging to the Port Henry Iron-ore Company and Messrs. WITHERBEES, SHERMAN & Co., for the reason that they are so extensive, that they in reality form one huge bed, and that the two companies are so associated together, while still preserving their individuality, and having so many interests in common, both interests of partnership and interests of a like nature, that it is almost impossible to write of the one without writing of the other.

"The district in which these great ore-beds lie is known throughout the region as the Moriah District, and the beds themselves lie in a mountain plateau at an elevation of over 1,300 feet above the lake, seven or eight miles in a northwesterly direction from Port Henry. The existence of iron ore in this mountain was known at least half a century ago, but little or nothing was done in the way of working it till a portion of the property was transferred, in 1849, to Messrs. S. H. and J. G. WITHERBEE. In 1853, the American Mineral Company was formed under the superintendence of Prof. EMMONS, the State Geologist, and they took a lease of the remaining property for the purpose of extracting the phosphates from the iron ore, to be used as fertilizers. It seems almost incredible, but it is none the less true, that this company, by their contract, agreed to turn over to the owners of the property all the iron ore, after they had extracted the phosphates from it, in addition to paying them a handsome royalty. Is it to be wondered at, then, that, after the unprofitable expenditure of a large sum of money, the enterprise was abandoned and the Company became insolvent? Then the owners of the property sold fractional shares or rights in the property, giving the proprietors of small forges in the neighborhood the power to mine so many tons of ore per annum. These forge-men would back a horse and wagon up to the breast of the bed, take out just so much ore as they wanted for the time being, and be seen no more till the demands of their little forge necessitated another visit to the ore bed. This state of things continued till the Port Henry Iron-ore Company was organized in 1858. The Company, however, never did much; and when, in 1863, Mr. EDWARD BECH and Mr. HENRY VAN RENSSELAER bought up all the claims against the American Mineral Company at Sheriff's sale, they also purchased all the stock of the Port Henry Iron-ore Company, and merged the two interests in one. These arrangements were carried out by Mr. JAMES B. BRINSMADE, then a lawyer practicing his profession in New York, and the confidential agent of Mr. BECH. Intimately associated with the late JOHN A. GRISWOLD, Mr. BRINSMADE brought him and Mr. JOHN F. WINSLOW into the resuscitated company. Shortly afterward, Messrs. WITHERBEES, SHERMAN & Co., and Mr. BRINSMADE himself, took stock in it. Neither Mr. VAN RENSSELAER nor Mr. WINSLOW remained long in the company, Mr. BECH and Mr. BRINSMADE purchasing the latter gentleman's interest. In December, 1869, a pro rata portion of each of the four interests was surrendered by the partners in the company, so as to admit the BURDENS, of Troy, into the concern and leave to each partner one-fifth interest in the property. Mr. BECH is since dead, and his interest is now controlled by Mr. BRINSMADE as executor of his estate. Otherwise the partnership remains on the same footing as in 1869.

"For a year they leased the property to WITHERBEES, SHERMAN & Co., who worked it in conjunction with their own adjoining mine; but in 1864 the Company took the working of the mine into their own hands, and since that date the two companies have been scooping out their riches side by side, till, in the three great openings which each Company has made in their share of the bed, they have taken out such quantities of ore as to unite the workings, the line of demarcation being now only an imaginary one, marked by a wire cord strung across the pit. Such was the birth of the largest and most valuable iron-mining enterprise in the United States, if not in the whole world. A few years ago the production of these two Companies was about 80,000 tons a year. It now reaches five times that quantity.

"Three great openings have been made by both Companies into the bed, besides several smaller ones. The large openings are now, from the empty space left by the quantity of ore which has been taken out of them, yawning pits of such an extent that it requires a very strong nerve to look down into them without shrinking. A pit, the mouth of which would be at least 250 square feet, and the tressle slopes which run down into it, often nearly perdendicular, are nearly 250 feet to the bottom, one must admit to be what a Yankee would call a 'mighty big hole.' On the other side of the pit, but far above you, is the great roof of solid rock, thirty feet in thickness, under which many hundreds of miners are now working. It is supported by five gigantic natural pillars of iron ore, which have been left for that special purpose. Each is over 100 feet high, and is estimated to contain 75,000 tons of the richest ore. The Port Henry Iron-ore Company propose to remove the roof off of three of these pillars during the next year. The work will cost them $125,000, but they will get $1,800,000 worth of ore from the pillars alone, besides obtaining increased facilities for pushing on their workings under the main portion of the roof. The roofs of all the workings in the pits belonging to both Companies are supported in the same way. Twenty-seven pillars in all—the Companies leaving one alternately at the line of demarkation between their respective properties—and the enormous excavated space forms a crypt, unique in its way and of unprecedented dimensions. In one part of the Port Henry workings the roof has fallen in, carrying away three pillars; but in this opening, underneath the foot wall, they have discovered a magnificent vein of ore, fourteen feet in thickness. They have sunk a new shaft to the vein and are just about commencing to work it. In all, the Port Henry Company own about 500 acres of land on the mountain, of which fifty acres are known to contain ore. Witherbees, Sherman & Co. own seventy-five acres; but, then, twenty-five of them are in the heart of the rich mines already developed. The area of the workings of the two Companies as yet does not comprise more than six acres.

Two prominent features of the Companies' works are the docks, the trestle-work railroad for dumping the ore on the docks, and the railroad leading from the docks to the mines. The trestle-work and docks alone cost $200,000. The docks run along the lake shore adjoining the New York and Canada Railroad, which is now being constructed. The trestle-work running over them is one mile and a half long, and there the bulk of the production of the mines is accumulated during the close of navigation. This year, 2,632 barge loads of ore have already been shipped from these docks, a barge-load averaging 108 tons. The railroad is well worth seeing. It was originally completed four years ago, but the Companies (they are partners in the docks and the railroad) have since then expended large sums upon it, till it is now as fine a road as there is in the United States. Trestle-work has been superseded by embankments, stone bridges have taken the place of wooden bridges, and the line has been relaid with steel rails. This was found to be absolutely necessary on account of the grade and the Spring freshets. It has of course entailed heavy expenditure, and has raised the cost of the road to $420,000. But the outlay has well repaid the Companies. The grade of the road, which is seven and a quarter miles in length, is, I believe, the steepest in the country—211 feet to the mile. This necessitates the employment of powerful locomotives. When the line was approaching completion, Mr. BRINSMADE applied to all the locomotive works for estimates, saying that he wanted engines to draw ten cars at the rate of eight miles an hour up the grade. Some said they could not be made; others thought they could make them, but would not agree to guarantee that they should perform the work. Only one firm—the Baldwin Locomotive Works of Philadelphia—had sufficient confidence in themselves to give the required guarantee. Such is the progress of mechanical science that to-day the Companies have locomotives that will draw thirty cars up the grade at twenty miles an hour. They have, all told, six locomotives and 160 cars, including four passenger cars; an equipment of rolling stock equal in proportion to that of the leading great railroad corporations. But this railroad, by giving such immensely increased facilities of transportation, has enabled the two Companies to increase their production in proportion. I have said that a few years ago the joint production of the two Companies was about 80,000 tons a year. But the production has steadily and rapidly increased during the last five years. It was in

	Tons.
1869	129,400
1870	164,200
1871	184,100
1872	292,000
1873	259,300
Add for October, November and December, 1873,	90,000
Total tons	1,119,000

or an average for the five years of 223,800 tons, against 129,400 tons, the product of 1869.

Iron on Staten Island.

ONE of the New York papers says of the Staten Island iron mines, that within the past few years large deposits of very superior ore have been opened, and mining operations are, at the present time, being carried on extensively. The Richmond Iron Mining Co., at Castleton, have been at work for six years, and are taking out 50 tons of ore per day. The ore consists of both hematite and magnetite, and is found in strata and pockets, at an average depth of seven feet, and extends from this point to the serpentine rock, at a depth varying from 12 to 30 feet. The formations are remarkable, and the superintendent of the mine says that in a mining experience of many years he has found nothing at all resembling them. There are no surface indications, and, consequently, most of the operations of the miners are governed by speculation. Owing to the great abundance of the ore, a drift in almost any direction is pretty certain to yield satisfactory results.

The ores are washed in a Bradford Washer, having a capacity for cleaning 150 tons per day, and are conveyed directly from the mine to the docks of the company, at West New Brighton, and are shipped mainly to Poughkeepsie and Albany, realizing about $5 per ton. The company, since the commencement of operations, have taken out 150,000 tons of ore, which has yielded about 60 per cent. of superior iron, and entirely free from phosphorus. The iron is largely used in the manufacture of steel.

Hell Gate.

THE following is the annual report of General NEWTON, United States Engineer, in charge of the government works at Hell Gate, East River, New York, to Gen. A. A. HUMPHREYS, Chief of Engineers:

UNITED STATES ENGINEER OFFICE,
NEW YORK, August 20, 1873.

GENERAL—I have respectfully to furnish the annual report of operations for the removal of rock in the channel of East River and Hell Gate. The operations at Hallett's Point, Hell Gate, have been directed by the driving forward of the tunnels and galleries of that work. The following table exhibits the length of the various tunnels and galleries to June 30, 1873:—

No.	Feet.	No.	Feet.
1	293.56	2d	48.04
2	185.76	2e	79.30
3	199.98	3a	75.88
4	194.53	5a	129.51
5	191.25	5b	51.05
6	224.08	5c	50.25
7	230.58	6a	177.68
8	213.92	6b	124.10
9	221.19	6c	133.89
10, old	193.55	10a	104.55
2a	147.57	10b	184.28
2b	102.04	10c	78.15
2c	114.97	Galleries	2,154.00
Total			5,884.00

The progress made during the past year in driving forward the tunnels and galleries was 2,731 lineal feet. The quantity of rock removed during this period was:—By hammer drilling, 1,750 cubic yards; by the Burleigh drills, 7,619 cubic yards, and by the two diamond drills, which were at work during July and part of August, 185 cubic yards. The number of feet of holes drilled was:—

	Lineal Feet.
By hammer drilling	15,809
By Burleigh drills	78,149
By diamond drills	1,903
Total	95,861

or at the rate of ten lineal feet of holes drilled to one cubic yard of rock. The quantity of explosives used to blast this length of holes was 11,808 lb. of nitro-glycerine, 1,218 lb. of giant powder, and 3,445 lb. of black powder, divided into 23,592 cartridges—*i. e.*, an average of one cartridge to four feet in length of hole. The length of Bickford fuse expended was 94,150 feet. The average speed of the hammer drilling per shift of eight hours was 5.4 feet, or at the rate of 2.7 feet for each man of the gang. The number of drills sharpened for hammer work was 34,529, and the loss by abrasion and dressing was 2,952 lb. of English steel, or nearly three ounces per lineal foot of hole drilled. Each drill in hammer work made 0.46 feet forward before being sharpened. In hammer work 9.03 feet of hole and 0.9 pounds of nitro-glycerine correspond to one cubic yard of rock blasted. But the cost of rock removed by this process is so much in excess of the process by the Burleigh drill, that it has been restricted by my direction to the few cases in practice, where hammer work is indispensable. The Burleigh drills have made for the year an average, for each machine, of 28 feet per shift of eight hours. Their speed has steadily increased by experience gained, and for some months past may be reckoned at 30 feet per shift. The cost of removal by this method is much less than by that of hammer work or by the use of the diamond drill.

The loss of steel by abrasion and drilling was 2,592 pounds, or at the rate of 0.54 ounces per lineal foot. It is proper to add, however, that the above deductions should be confined to the locality and rock encountered at Hallett's Point. A difference in the character of the rock and in the conditions of the problem might change the relative excellence of the several modes employed, particularly as between the Burleigh and diamond drills. Up to the fiscal year terminating June 30, 1872, the work had been carried on by hand drilling, though the intention to introduce, or at least to test the effect of, machine drilling had always existed. Many causes of delay intervened. Among these were the cost and time required for the putting down the power apparatus required to drive the machine drills, and the real doubt that existed concerning economical application of machine drills to the confined headings at Hallett's Point, and to the limited length of holes and minute charges which we were obliged to adopt.

Add to these difficulties the fact that the diamond drill had not been used as a tunnelling drill while the Burleigh drill had made but 18 or 19 feet of hole per shift, and required one drill in the shop under repair for each one at work. The last fact indicated the necessity of extensive workshops for repairs, the cost of which it was necessary to consider in the general problem. However, in spite of delays so caused, public advertisements for drilling by machinery were made and responded to early in January, 1871, and resulted, in October, 1871, in the employment of the Burleigh drills, by contract, to bore in the tunnels. At the same time a diamond drill was purchased—partly as an experiment—to work in opposition to the other drills. Although the Burleigh drills were worked by the company, yet in June, 1872, the difference in progress between the two drills was not striking and in some points was doubtful. Captain WILLIAM H. HEUER, corps of engineers, having been assigned to duty under me, I directed him, in July, 1872, to experiment with a Burleigh drill, and the results were so advantageous that additional drills were purchased.

The Burleigh drill has been gradually perfected during the last few years, and to this we owe the diminished amount of repairs. To Captain HEUER's attention to his duties and to the experienced managers of the drills we owe the largely increased progress of this drill, which, as before stated, is now thirty feet per shift. I take this opportunity to mention Captain HEUER's careful superintendence of the works at Hallett's Point and to express my obligations for the full and detailed statement of the various operations at that place, which have proved the basis of this report. During the past year a model of Hallett's Point, authorized by the Hon. Secretary of War, was prepared and sent to the Vienna Exposition.

The operations have hitherto been conducted with a view to explore the whole area to be removed, and I have to add that this part of the operations requires for its completion the additional driving of about 1,000 lineal feet of tunnels. We have been much delayed, and the cost of the operations has been increased by being compelled to work under appropriations not sufficient for rapid or economical progress. These matters have been touched upon in previous reports, and I repeat them here simply from a sense of duty. The annual drawings will be transmitted when completed.

STEAM DRILLING SCOW.

The operations of this machine were upon Diamond Reef until July 12, 1872. Twelve holes were drilled and blasted, and three surface blasts made, and 675 tons of rock were removed by Morris & Cummings' Grappling Machine. The scow was moved to Hell Gate July 12, and, after being moored upon Frying Pan, commenced drilling July 22; made 17 holes and 11 surface blasts; August 3, took up anchors and moved off the reef. The scow was anchored over Pot Rock August 5, where it remained until running ice drove the scow into winter quarters, December 28, 1872. Forty holes were drilled and blasted, 60 seam blasts and 24 surface blasts were made. The surface of the rock was covered with a large débris of small stone, which was first removed by means of a rake in order to drill. A quantity of stone was thus removed from the reef, of which no account has necessarily been kept. As it was impossible to use Morris & Cumings' grapple in removing loose rock in this locality, buckets, filled at slack water, constituted the other means of removal. The quantity thus removed is estimated at 211 cubic yards. The difficulty of mooring the scow, so that it would not drag and interfere with the dome, was great when exposed to these rapid currents; but this could be and was overcome. The real source of delays, damage and danger to those employed was from collisions, of which sixteen were encountered while the scow was at work on Pot Rock. The delays arose from the breakage of the cable chains connected with the anchors, and the period of time required to search for and find the ends of the chains before the scow could be moored again. It is solely due to these accidents that the whole of Pot Rock was not removed last Fall.

The experiences derived from the operations of this machine are, first, that the cylinder on the dome has never been of use; it was carried off in August, 1872, by a collision, and replaced during the remainder of the season by a temporary wooden structure, which latter has been dispensed with, and the dome is now used free of such encumbrances and dead weight resulting therefrom. Second, the dome has not acted as a dam, the top of the cylinder having never, except accidentally, risen to the surface of the water, while the bottom of the dome, not lying close to the rock but levelled upon its legs, has permitted a free rush of the currents under it and upon the person of the diver working upon the bottom.

A rapid current, while the tide was running, from the bottom through the dome, discharged itself through the top of the dome. The water in the well hole of the scow was always above the level of the exterior water, and, in very rapid currents, was on a level with the curbing of the well. The divers have reported that it was more difficult to work at the bottom with this machine than without its assistance, and the reason of this is manifest, viz:—The obstruction to the currents arising from the broad bottom of the scow and from the dome caused a thorough change in the velocities of the currents from the top to the bottom, decreasing the first by friction, and, by the velocity of the water pushing from behind and the head raised by the obstruction mentioned (which tended to keep up the discharge), necessarily increasing the velocity at the bottom, where the divers were at work. The result was that no work was done at the bottom by the divers, except during the time of slackened currents, when no protection was necessary. Third, there has never been any practical difficulty in all currents to remove and to return the drills to the drill tubes from the deck of the scow, and consequently without the use of divers. This is very evident if recollection is had of simple mechanical devices, which suggest themselves, of lowering a drill to the mouth of the tube and inserting it, and likewise by reflecting that the drill tubes could be made of such length as to reach nearly or quite to the surface of the water, and also could be made to slide in the collars supporting them, by which means the top of the drill tube could be brought to any level desired for the insertion of the drill rods. All of these appliances were made. Fourth, the only use of the dome for drilling purposes is to provide a fixed and stable platform, and with less weight than by other contrivances for a large number of drills operated at the same time. Fifth, that to make a dam of a dome or kindred shape, other and essential appliances, which we have never had occasion to use or construct, are necessary.

The operations of the steam drilling scow were superintended by Mr. CHARLES A. ECCLESTON. Respectfully submitted. JOHN NEWTON, Lieutenant Colonel of Engineers, Brevet Major General.

The State of Trade.

We cut from our exchanges the following items relating to the condition of manufactures, premising that we have not attempted anything like a thorough search:

PENNSYLVANIA.—The demand for pig iron has fallen off. There is now little or no inquiry. If, however, gray forge iron could be obtained there would be good demand for it. The price of the latter keeps firm at from $27 to $29 at the furnaces, which does not pay for making it.—(Philadelphia.)

At a meeting of Pittsburgh, Pa., furnace-owners, on Saturday, at which every furnace in that city and vicinity was represented, it was unanimously resolved that on and after to-day a reduction of 10 per cent. would be made on all labor. Though the new furnace of the ECKERTS, in Reading, Pa., is ready to be blown in, it will not be started. Only three of the nine blast furnaces in Sharpsville, Pa., are in operation. The Harrisburg, Pa., Car Works have reduced their force. The Phœnix Iron Co., Phœnixville, Pa., have been reducing wages. Boilers will receive $6 per ton, puddlers $5.50; and helpers' wages will be reduced four cents per heat. All other wages at the mills, blast furnaces and shops, as well as other labor, will be reduced 10 per cent. Where the daily earnings or wages are at present $1.50 or less, the deduction will be 10 cents per day; but when less than $1, the deduction will be 5 cents per day. The managers of the Cambria, Pa., Iron Works, Johnstown, announce their determination to keep the furnaces going all winter, if possible, and to pay in full in cash as long as it can be obtained. The orders for their manufactures have fallen off largely. The Fishback Puddle and Rail Mills, Pottsville, Pa., have suspended, and 600 hands are thrown out of work. Most of the mills are still in operation, although running single turn, but it is the opinion of some that they will have to shut down before long unless there is a marked revival in trade. The card has been reduced from 3 8-10 to 3 3-10, usual time to the trade. This, however, does not mean a reduction in the price of iron, but it is a reduction in wages—a reduction of from 7½ to 12½ per cent. in the pay of all skilled workmen in iron. A reduction was also made of 10 per cent. on the wages of unclassified labor, such as engineers, firemen, roll hands, laborers, etc.—(Pittsburgh.)

NEW YORK.—The Troy *Times* of Monday evening says: "Business is much better at the steel works than it has been, and the men are now getting out twelve heats a turn, instead of ten as formerly. A rumor is in circulation to the effect that the Messrs. BURDEN intend to start all their mills not affected by the long strike, on the 24th of November and that the wages will only be reduced to the scale of last Winter's prices. This statement is said to come from JAMES BURDEN, but it is possibly a mistake. No scale of prices has been submitted to the men employed in Corning's Mills as yet, and it is not expected that one will be submitted for some time to come. The New York Central Railroad Company is $50,000 in debt to Corning & Co., and it seems that there is no immediate prospect of getting the money. Work has not been resumed in the Rensselaer Rolling Mill, as was expected. The puddlers held a meeting Saturday night, and decided that they would go to work at $5 25 per ton. The price offered by the company is $5 10; the price paid last Winter was $5 35. The most disastrous strike that has occurred at the iron works or in this city in many years is the one at Burden's Mills, on the flats. The only other suspension of work that looks anything like a strike is the refusal of the puddlers at the old Rensselaer Mill to go to work for the wages offered them. The puddlers are the strikers. They have made large wages, and perhaps can afford to lie idle awhile, having been enabled to lay by something for a rainy day, but the laborer could not do this, and he, who really had nothing to do with the strike, must bear the brunt of the suffering. So, too, the puddlers have their unions, and can go to them for help while they lie idle, but the laboring man must work somewhere or see his family starve. Such is the case at both the mills above mentioned.

All work at the iron mines at Sylvan Lake has ceased, and many of the furnaces along the river are discharging men.

NEW JERSEY.—The workmen in J. W. Starr & Sons foundries, on Cooper Creek, near Camden, have consented to continue work at a reduction of ten per cent. in their wages.

Lead Ore of the Historic Period.

MR. SCHLIEMANN, a gentleman who undertook the task of uncovering the site of ancient Troy met with remarkable success in his efforts and from the following account we should say his minor discoveries were equally remarkable. What is meant by the assertion that "a thin layer of lead ore and copper" lay between the strata of two demolished civilizations? The extract is taken from *Galignani* which founds its article on one by a French writer, and there may be an error in translation. But *Galignani* is an English paper published in Paris, and surely ought to be able to render one language into another with correctness. From the vast number of metal relics found in the ruins we should say that there is no inherent improbability in a theory that nature has seized upon the metals of which men once robbed her and re-transformed them to ore. But in that case it would be more likely to be copper ore than lead ore.

By his first discoveries, M. SCHLIEMANN was led to seek for the site of Troy in the very spot where antiquity had placed it, that is to say, at a locality called Hissarlik, not far from the sea, and this is what he found: A modern stratum, containing some Roman relics and some very important inscriptions, extends over the hill to a depth of two yards. Besides the Greek antiquities anterior to the Roman epoch, the first layer furnished some objects in iron, with arms and nails of bronze, but not a single article of pure copper; among the specimens of purely Greek origin and historical date was found a slab of white marble belonging to the Temple of the Italian Minerva, the lower part of which building has been uncovered.

Below the Hellenic stratum, which was the remains of a colony which must have lasted more than a thousand years, and only disappeared under Constantine II., lies the Trojan and pre-historic bed with a depth of as much as sixteen yards. In this accumulation of rubbish is found neither bronze nor iron; all the metal objects are in pure copper, silver, gold, or electron, (a very fine mixture of the two latter.) At the depth of nine yards a thin layer of lead ore and copper extends nearly over the whole mound, which was itself fortified. M. SCHLIEMANN has cleared away the principal entrance, which is paved and flanked by solid buildings; the wall at the side is not less than thirteen yards in thickness. Near the spot, in a commanding situation, are the remains of a large princely edifice, by the side of which was found the treasure of which I will presently speak. The ruins of the town allow at least three strata to be distinguished; the upper one, about two yards thick, leading to a supposition that the houses were of wood, and that they had been burnt. The second bed contains many walls, formed of stones cemented with mud, similar to those which we ourselves found at Santorin under the pumicestone of the volcano. The third layer contains houses constructed with unbaked bricks, according to the ancient custom of Central Asia. All this part shows the traces of an immense conflagration; the vases and metals have been calcined or soldered by the fusion; the surface of the bricks has been glazed by the flames of a vast furnace.

This last bed is from seven to ten yards in thickness. Below the depth just mentioned there existed a still more ancient city, where walls have been found composed of enormous stones weighing from one to two tons each. It was the first founded in that place, for it rests on the virgin soil, which is a calcareous rock. A whole volume would be required to describe the objects brought from the Troad by M. Schliemann, as the number is more than 15,000. Many of them are vases in terra cotta, some turned in a lathe and others modeled with the hand; none of them are painted, but most represent a woman with prominent breasts and the face of an owlet, like the Minerva of Homer, wearing a sort of helmet. The worship of the "Glaecopis Athéne" was manifestly the principal one of the place, for a great number of Palladiums in terra cotta, stone, or bone have been found, representing that Divinity, sometimes in a very striking manner. The instruments of pure copper, with the moulds and crucibles used for their manufacture, tools and weapons of flint, the remains of lyres for seven or four strings, several thousand double cones pierced with a hole, and known under the name of fusaioles, for female ornaments, mortars, mills, &c., all form an *ensemble* such as no museum in Europe can boast of, and will furnish inexhaustible subjects of study. It is an entire feudal civilization now revealed to us.

What we can affirm is that the race which has left these memorials was unacquainted with iron, and was anterior to bronze. It was, therefore, also prior to the *Iliad*, in which bronze, tin and iron are frequently mentioned. The inhabitants of the place were shut up in a citadel; twenty wells dug outside by M. Schliemann, have demonstrated that there were no dwellings beyond the walls. The population lived under the rule of a feudal lord, whose stronghold has now been brought to light. Therein have been discovered, besides a host of minor objects, several vases of pure gold, silver, or electron, two magnificent necklaces composed of a multitude of ornaments and small chains of a primitive but still advanced manufacture; several thousand gold beads, well cut; eight bracelets and thirty-six ear-rings of the same metal. There is no doubt that these valuables belonged to the proprietors of the chateau, and that the master was at the same time the sovereign of the country. But what was the name of the king? Was it Priam?

Dr. Siemens on Fuel.

DR. SIEMENS, the well-known metallurgical inventor, lately gave a lecture to workingmen in Bradford, England, in which he endeavored to show them how much the enormous consumption of coal is due to wasteful habits, and how judicious economy might have the happiest effect upon their expenses not only in the quantity of coal used, but in the price paid for it. He said: We have now come to the third branch of consumption, the smelting or metallurgical furnace, which consumes about 40,000,000 of the 120,000,000 tons of the fuel produced. Here also is great room for improvement, the actual fuel consumed in heating a ton of iron up to the welding point, or of melting a ton of steel, is more in excess of the theoretical quantity required for these purposes than is the case with regard to the production of steam-power and to domestic consumption. Taking the specific heat of iron at ·114, and welding heat at 2700° Fahr., it would require 2700×.114=307 heat units to heat 1 lb. of iron—1 lb. of pure carbon developes 14,500 heat units, 1 lb. of common coal 12,000, and, therefore, 1 ton of coal should bring 39 tons of iron up to the welding point. In an ordinary re-heating furnace 1 ton of coal heats only 1¾ ton of iron, and therefore produces only 1-23d part of the maximum theoretical effect. In melting 1 ton of steel in pots 2½ tons of coke are consumed, and taking the melting point of steel at 3600° Fahr., the specific heat at ·119, it takes ·119 multiplied by 3600=428 heat units to melt 1 lb. of steel, and taking the heat-producing power of common coke also at 12,000 units, 1 ton of coke ought to be able to melt 28 tons of steel. The Sheffield pot steel melting-furnace, therefore, only utilizes 1-70th part of the theoretical heat developed in the combustion. Here, therefore, is a very wide margin for improvement, to which I have specially devoted my attention for many years, and not without the attainment of useful results. I have since the year 1846, or very shortly after the first announcement of the dynamical theory, devoted my attention to a realization of some of the economic results which that theory ren-

dered feasible. I fixed upon the regenerator as the appliance which, without being capable of re-producing heat when once really consumed, is extremely useful for temporarily storing such heat as cannot be immediately utilized in order to impart it to the fluid or other substance which is employed in continuation of the operation of heating or of generating force.

Without troubling you with an account of the gradual progress of these improvements, I will describe to you shortly the furnace which I now employ for melting steel. This consists of a furnace-bed made of very refractory material, such as pure silica, sand and silica, or Dimas brick, under which four regenerators or chambers filled with checkerwork of brick are arranged in such a manner that a current of combustible gas passes upwards through one of these regenerator, while a current of air passes upward through the adjoining regenerator in order to meet in combustion at the entrance into the furnace chamber. The products of combustion, instead of passing directly to the chimney, as in an ordinary furnace, are directed downwards through the two other regenerators on their way towards the chimney, where they part with their heat to the checkerwork in such a manner that the highest degree of heat is imparted to the upper layers, and that the gaseous products reach the chimney comparatively cool (about 300° Fahr.) After going on in this way for half-an-hour, the currents are reversed by means of suitable reversing valves, and the cold air and combustible gas now enter the furnace chamber, after having taken up heat from the regenerator in the reverse order in which it was deposited, reaching the furnace, therefore, nearly at the temperature at which the gases of combustion left the same. A great reversion of temperature within the chamber is the result, and the two first-mentioned regenerators are heated to a higher degree than the latter. It is easy to conceive that in that way heat may be accumulated within the chamber to an apparently unlimited extent, and with a minimum of chimney draught. Practically the limit is reached at the point where the materials composing the chamber begin to melt, whereas a theoretical limit also exists in the fact that combustion ceases at a point which has been laid by ST. CLAIR DEVILLE at 5000° Fahr., and which has been called by him the point of dissociation. At this point hydrogen might by mixed with oxygen, and yet the two would not combine, showing that combustion really only takes place between the units of temperature of about 500°, and 4500° Fahr.

To return to the regenerative gas furnace. It is evident that there must be economy where, within ordinary limits, any degree of heat can be obtained, while the products of combustion pass in the chimney only 300° hot. Practically 1 ton of steel is melted in this furnace with 12 cwts. of small coal consumed in the gas-producer, which latter may be placed at any reasonable distance from the furnace, and consists of a brick chamber containing several tons of fuel in a state of slow disintegration. In large works a considerable number of these gas-producers are connected by tubes or flues with a number of furnaces. Collateral advantages in this system of heating, which is now extensively used in this and other countries, are that no smoke is produced, and that the works are not encumbered with solid fuel and ashes.

It is a favorite project of mine, which I have not had an opportunity yet of carrying practically into effect, to place these gas-producers at the bottom of coal pits. A gas shaft would have to be provided to conduct the gas to the surface, the lifting of coal would be saved, and the gas in its ascent would accumulate such an amount of forward pressure that it might be conducted to a distance of several miles to the works or places of consumption. This plan, so far from being dangerous, would ensure a very perfect ventilation of the mine, and would enable us to utilize those waste deposits of small coal (amounting on the average to 20 per cent.) which are now left unutilized within the mine. Another plan of the future which has occupied my attention is the supply of towns with heating gas for domestic and manufacturing purposes. In the year 1863 a company was formed, with the concurrence of the Corporation of Birmingham, to provide such a supply in that town at the rate of 6d. per 1,000 cubic feet; but the bill necessary for that purpose was thrown out in Committee of the House of Lords, because their lordships thought that if this was as good a plan as it was represented to be, the existing gas companies would be sure to carry it into effect. I need hardly say that the existing companies have not carried it into effect, having been constituted for another object, and that the realization of the plan itself has been indefinitely postponed.

MINING SUMMARY.

Arizona.

Extract from a correspondence of the San Diego *Union*, dated Tucson October 4:

PATAGONIA.

On the flat is located the smelting works—now in a dilapidated condition—of the old Mowry mine, and the houses which lodged the workmen. Alongside the works runs a gulch in which water is found.

THE MOWRY MINE.

To the north, about half a mile over a gently ascending road, is the Mowry mine. We passed, in going to it, Mowry's house and store, with large corral attached. They told me as we wandered through these deserted rooms, of an Indian siege it sustained; but of that presently. The mine is one of the most accessible and favorably located I ever saw, and I have been in mining sections a long time. The cost of hauling the ore to the furnaces is very trifling, and there is abundance of wood for coal in the immediate vicinity. This mine has quite a history. It was loated in '59, and work was commenced the following year. It came into SYLVESTER MOWRY'S hands, who got SPRAGUE of Rhode Island, ANDREW of Massachusetts, BARLOW of New York, and other big men interested in it, and it was worked with changing fortunes up to '67. The main shaft on it was down to a depth of 350 feet; from this drifts are run, and the ore stoped out. It is found in limestone, which is backed by granite, in bodies now large, now small, rather than in a vein of determinateness. It is a galena ore carrying silver, with the carbonate and oxide of lead and much iron. In a shaft on the west end of the mine masses of pure carbonate of lead—a very pretty mineral—is found. The ore is most readily smelted, and was carried to furnaces on the flat before noted for that purpose. Here they had twelve smelting furnaces, and four cupels for refining; only six of these furnaces were at work at one time, while the other six ere being repaired. The greatest capacity of one of these furnaces was one and a half tons per day, the six not averaging over eight tons. The brick for them was made near by, but they were very inferior in quality, and frequent repairs were necessary. The lead as run out in pigs was refined on the ground, which was a mistake; first, because their process of refining was rude, and much of the silver was run off with lithatge; and, secondly, because the lead was all lost, which in itself should have yielded a profit. It has been found by careful estimate that the lead will pay for shipment and yield a profit of $50 per ton—shipped to San Francisco via Guaymas. When you get your railroad completed and refining works at San Diego, as you will have some day, this $50 margin will be considerably increased. The ore worked was little selected, and was sometimes poor, and they *saved* on an average, as told me by a gentleman who superintended it for some time, but about $20 per ton. If they had shipped the pig lead and had it refined where there are better facilities, they would have realized about $50. While the ore is seen to be of low grade, there is such a great quantity of it, that with careful business management the mine could be made to yield largely.

When CARLTON came in here in '62, with his California troops, he sent down to Patagonia one hundred and fifty cavalrymen, surrounded the camp one night and captured the "outfit." He arrested MOWRY on the charge of treason, alleging that he had been communicating with JEFF. DAVIS. MOWRY and all his associates were brought to Tucson, and he sent to Yuma as a prisoner. CARLTON appointed a receiver for the Government over the mine, and worked for two or three months, when MOWRY was released and the mine turned over to the original owners. They suffered much from the Apache depredations, and many lives were lost in the vicinity; a graveyard near the mine has some thirty buried in it—nearly all killed by Apaches.

In '67, while there were but four men in the house or about the corral, the Indians made a determined attack upon them—CACHISE is supposed to have been there in person. One man was killed outright. BUCKALEW, our present Clerk of the District Court, who had just brought in the mail, was shot down at the corral gate—bullet marks are still to be seen on the wall by it. Mr. YERKES, agent for the company, rushed out amidst a shower of bullets and dragged him in. BUCKALEW lost his leg by that shot, and now hobbles around our streets on crutches. The Indians maintained the siege all day, and a portion of the night, until help arrived from Santa Cruz, where word had been taken by a couple of men who had left the mine in the morning before the attack, but were discovered on the road by the Indians and chased some distance. This was about the winding up of operation on the mine. Little or no work was done on it afterwards. The causes ascribed for the failure to make it pay permanently are: Expensive management—a large number of men on big salaries were kept hanging around it; crude way of working, and consequent loss; loss of life and property from Indian incursions; and finally it is said that MOWRY, who was reckless of his moral obligations, cared little whether he made the mine yield a profit or not; he was making considerable in his store, and traded on the confidence of his backers—obtaining large sums of money by hypothecating interests in the mine. Some work has been done here lately and the owners are taking steps to procure a Government patent for it.

There are other mines of merit in the vicinity of the MOWRY. The Guajalote, claimed by H. D. BACON of San Francisco—of the old time Page, Bacon & Co.—, and others, is the principal one I noticed. This carries a rich ore in a good sized vein so far as opened. Application for patent has been made for this mine.

Idaho.

The Owyhee *Avalanche* of October21 has the following local Mining Record:

GOLDEN CHARIOT.—The old abandoned drifts in the 4th level of this mine have been started up, and are being driven south with the prospect of finding good pay therein. The 6th level is also being driven south in good ore. The stopes from the 6th to the 8th level are producing about 18 tons per day of high grade ore. The 8th level is being driven south in a fine looking vein of ore from 2 to 2½ feet in width. They are also getting ready to run the 9th level south, and will immediately commence to sink the main shaft 100 feet deeper. Present indications are very encouraging, and it is the intention to prospect the mine on a large scale. Improvements are being made on the surface which will greatly economize labor and facilitate the assorting of the ore.

MINNESOTA.—This mine is now yielding about 45 tons of ore per day. They have just come upon an entirely new body of ore in the 4th level north; it is large and similar in appearance and richness to that formerly found in the Golden Chariot. In the 5th level north the ore is of the same character as that found in the 4th level.

The stopes throughout the mine are all looking extremely well. They are preparing to open stopes in the 5th level south, and are also making arrangements to sink the main shaft. Five contracts have just been let to drive the various levels. As in the case of the Golden Chariot, improvements are being made on the surface, with a view of assorting and handling a larger quantity of ore with less men than have heretofore been employed.

WAR EAGLE.—The 5th level drift is being driven south as rapidly as possible, and the shaft is being put down for the 6th level. The operations on this mine at present are strictly confined to prospecting, with the view of opening up a rich body of ore known to exist south of the shaft.

RED JACKET.—The Clark shaft has been connected with and is now down 80 feet below the adit level, showing a large vein prospecting well in both gold and silver. Lumber and other material are accumulating at the mine preparatory to the immediate erection of steam hoisting works, which will greatly facilitate the operations to be carried on during the coming winter. Next season the Red Jacket may be expected to wheel into the line of dividend paying mines.

MAHOGANY.—Splendid ore continues to be taken from the 6th and 7th level stopes in this mine. The 8th level stopes, both north and south, are also looking well. The new boiler is being placed in position which will greatly increase the hoisting facilities of the mine.

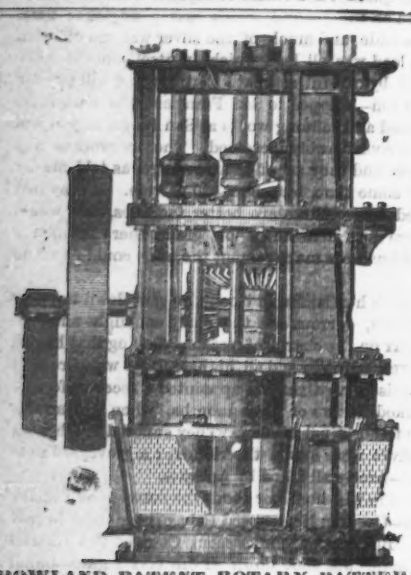
SOUTH CHARIOT.—The 7th level drift is being driven north, with the expectation of tapping the rich body of ore found in the 6th level. They are also sinking the winze.

EMBIRE.—Work is progressing in all the levels of this mine, and it will soon be in condition to yield ore in abundance. Plenty of Winter supplies are being laid in, and the prospect of the mine is truly flattering.

IDA ELLMORE.—The stopes in the 10th level north are yielding a fine quality of ore. The vein is from 4 to 5 feet in width. The 10th level drift is being extended north as expeditiously as possible. The new boiler is expected to arrive to-day, and, when in position, will greatly add to the working facilities of the mine.

Work is progressing as usual on the Illinois Central, Idlewild, Norfolk, Poorman, Crown Point and Belle Peck, all of which are yielding splendid ore.

MINING MACHINERY, ETC.



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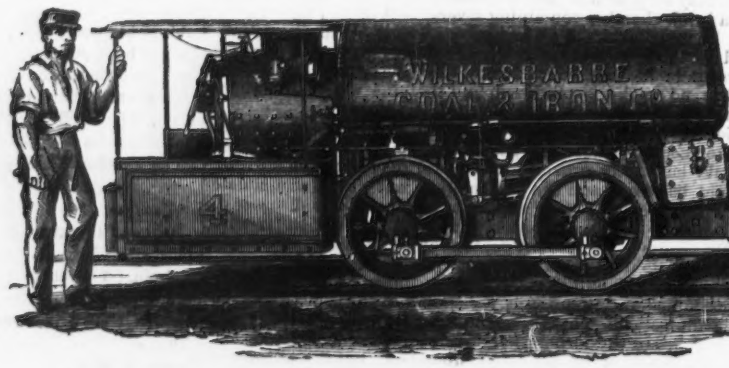

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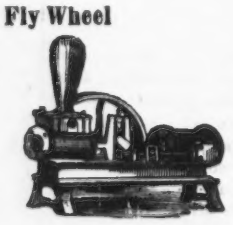

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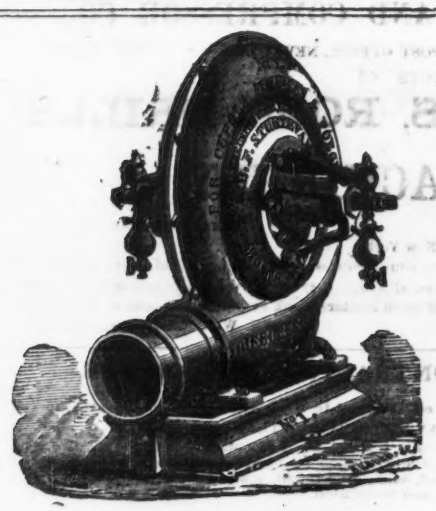

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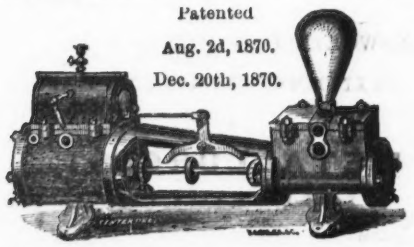

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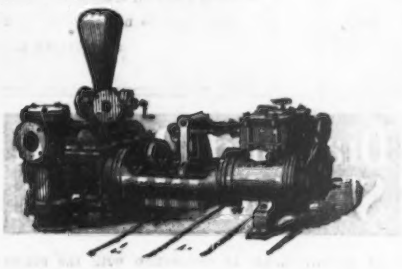

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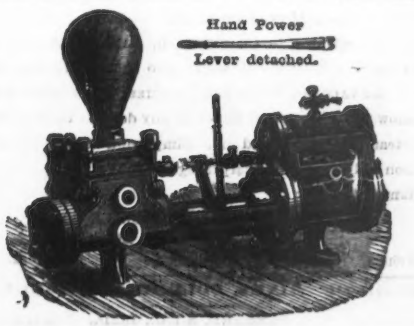

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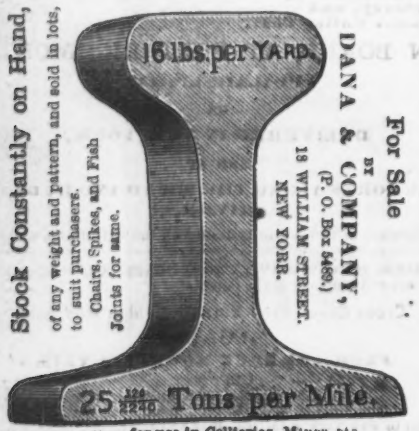

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